TROPICAL DISEASES BULLETIN

Vol. 36.] 1939. [No. 8.

Main Contents:

SUMMARY OF RECENT ABSTRACTS.
VII. HELMINTHIASIS.

YELLOW FEVER.
TRYPANOSOMIASIS.
MALARIA.
LEPROSY.

For detailed Contents see pp. ii, iv, vi & viii.

IMPERIAL [illegible]
13 4 1939
INSTITUTE

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-, With Supplement 25/-.

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

Chairman:

A. J. R. O'Brien, C.M.G., *M.C.*, M.B., Ch.B., M.R.C.P., D.P.H.
(*Chief Medical Adviser to the Secretary of State for the Colonies*).

Wm. Horner Andrews, D.Sc., M.R.C.V.S.

Thomas Carnwath, *D.S.O.*, D.Sc., M.B.
(*representing the Ministry of Health*).

Sir Arthur Horn, C.M.G., M.D., M.R.C.P.

Professor Sir Wilson Jameson, M.D., F.R.C.P.

Professor Sir John Ledingham, C.M.G., LL.D., D.Sc., M.B., F.R.C.P., F.R.S.
(*representing the Royal Society*).

G. Carmichael Low, M.D., F.R.C.P.

P. H. Manson-Bahr, C.M.G., *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Major-General Sir John Megaw, K.C.I.E., K.H.P., M.B., Ch.B., I.M.S. (retd.).

Sir Edward Mellanby, K.C.B., M.D., F.R.C.P., F.R.S.,
(*representing the Medical Research Council*).

I. A. D. Wilson-Young,
(*representing the Foreign Office*).

Gerard L. M. Clauson, C.M.G., O.B.E.
(*of the Colonial Office*).

Secretary: J. B. Sidebotham, *of the Colonial Office*.

STAFF OF THE BUREAU:

Director:

H. Harold Scott, C.M.G., M.D., F.R.C.P., D.P.H., D.T.M. & H.

Assistant Director:

C. Wilcocks, M.D., Ch.B.

Secretary:

R. L. Sheppard.

SECTIONAL EDITORS, TROPICAL DISEASES BULLETIN.

Professor P. A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H.

Lt.-Col. E. D. W. Greig, C.I.E., D.Sc., M.D., F.R.C.P.E., I.M.S. (retd.).

Maj.-Gen. D. Harvey, C.B., C.M.G., C.B.E., M.D., R.A.M.C. (retd.).

Lt.-Col. W. F. Harvey, C.I.E., M.B., F.R.C.P.E., D.P.H., I.M.S. (retd.).

Professor Edward Hindle, M.A., Sc.D., Ph.D.

Lt.-Col. H. Kirkpatrick, M.B., B.Ch., I.M.S. (retd.).

Lt.-Col. Clayton Lane, M.D., I.M.S. (retd.).

Lt.-Gen. Sir W. P. MacArthur, K.C.B., *D.S.O.*, O.B.E., M.D., D.Sc., D.P.H., F.R.C.P., F.R.C.P.I., K.H.P.

Lt.-Col. A. G. McKendrick, D.Sc., M.B., Ch.B., F.R.C.P.E., I.M.S. (retd.).

Maj.-Gen. Sir Leonard Rogers, K.C.S.I., C.I.E., M.D., F.R.S., I.M.S. (retd.).

Hugh Stannus Stannus, Ph.D., M.D., F.R.C.P., D.T.M. & H.

M. Sydney Thomson, M.A., M.D., F.R.C.P.

C. M. Wenyon, C.M.G., C.B.E., M.B., B.S., B.Sc., F.R.S.

F. Norman White, C.I.E., M.D., D.P.H., I.M.S. (retd.).

Professor Warrington Yorke, M.D., F.R.C.P., F.R.S.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 36.] 1939. [No. 8.

SUMMARY OF RECENT ABSTRACTS.

VII. HELMINTHIASIS.*

General.

Scott and Headlee (p. 672) as a result of a study of the weights of series of consecutive stools consider that correction of helminth egg count figures for the consistency of the stools is unnecessary, but hold that in published papers the figures for both corrected and uncorrected data should be made available for comparison with other work.

In the examination of stools for helminth ova Galliard *et al.* (p. 267) find a double gravity precipitation technique superior to smear, Telemann's and Garin's methods. Lins (p. 216) employs an enrichment fluid of acetic and hydrochloric acids, formol and distilled water with which faeces are mixed before centrifuging.

Artigas (p. 216) uses a mastic-creosote fluid after treatment with acetic acid and creosote for the mounting of helminths and small arthropods.

Hukuda and Aki (p. 218) report that ordinary rinsing does not remove the various ova found on Tukemona sold in markets.

Halpérine (p. 670) shows that rise of temperature and loss of moisture in a mixture of faeces and peaty material causes destruction of Ascaris and Trichuris eggs.

Cochaux (p. 669) describes " nzadi " or " lupusu " as a syndrome of heavy hookworm or Ascaris infection combined with avitaminosis.

The following list of the percentages of helminthological findings detected in surveys by the use of methods of varying accuracy has been constructed from the abstracts in this section :—

* The information from which this series of summaries has been compiled is given in the abstracts made by the Sectional Editors in the *Tropical Diseases Bulletin*, 1938, Vol. 35. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

Author	Page	Country	No. examined	Percentages.														
				Hookworm	Ascaris	Trichuris	Enterobius	Strongyloides	Taenia	*H. nana*	*H. diminuta*	*S. japonicum*	*C. sinensis*	*F. buski*	*E. histolytica*	Giardia	Trichomonas
Neujean ...	217	Kitega ...	13,460	11·9	35	25	—	—	9·3	—	—	—	—	—	—	—	6
Legendre ...	217	Cambodia	361	54	30	9	—	9	—	—	—	—	—	—	14	—	—
Galliard *et al.*	267	Hanoi ...	500	21·05	64	55	1	1·57	0·8	—	—	—	8·6	—	2·37	0·8	—
Crenn ...	593	New Caledonia	426	77	—	11·7	—	6·9	—	—	—	—	—	—	—	12·4	—
May ...	668	Baden ...	828	—	17·6	12	0·84	—	0·12	—	—	—	—	—	—	—	—
Keller *et al.*	669	N. Carolina	37,346 (whites)	—	9·5	0·5	0·7	—	—	0·7	0·008	—	—	—	—	—	—
			6,301 (negroes)	—	22·5	3	0·03	—	—	0·27	0·06	—	—	—	—	—	—
Brug & Tesch	218	Celebes ...	98	35	3	—	—	—	—	—	—	8	—	—	—	—	—
McCoy & Chu	221	China ...	349	0·6	48	19	—	—	—	—	—	—	—	65	—	—	—

Trematodes.

Schistosomiasis.—In the Sudan (p. 266) it is reported that infection with schistosomes has declined remarkably during the last ten years.

Dowdeswell (p. 595) found *Physopsis nasuta* and *Bulinus forskali* to be hosts of *S. haematobium* in Kenya. *Ph. nasuta* is the host for *S. bovis*. Zavattari (p. 665) shows that the distribution of *Bulinus contortus* and vesical schistosomiasis in Libya correspond. In India de Mello (p. 596) considers *Melanoides tuberculatus* and *Limnaea luteola pinguis* to be hosts of *S. haematobium*, and describes an autochthonous human case.

Shaw and Ghareeb (p. 665) draw attention to the importance of pulmonary damage in schistosomiasis. In 282 autopsies on persons infected there were lesions in the lungs of 33 per cent. and in 2 per cent. these were the cause of death. Embolism by ova from extra-pulmonary worms may cause parenchymatous tubercles in which the ova escape from the arterioles; focal arterial lesions consisting of necrosis of intima and media following impaction, with capillary formation and hypertrophy of the proximal muscle coat; and Ayerza's disease consisting of rows of tubercles in the lines of the vessels caused by repeated embolisms. The latter gives the appearance of strands of silver wire throughout the lungs, and the lesions result in hypertrophy of the right heart. In 10 instances the actual worms were found in the pulmonary vessels.

Makar (p. 268) describes the appearances of congestive and atrophic lesions of schistosomiasis in the prostatic urethra as seen through the urethroscope. From a study of the literature Bogliolo (p. 266) concludes that *S. haematobium* is found unusually often in cancer of the bladder, which is probably caused by the irritation of the eggs. *Cysticercus fasciolaris* and adult *Gongylonema neoplasticum* are associated with cancer in animals.

With reference to treatment by fouadin Diamantis (p. 599) reports the death of a child treated for *S. haematobium* infection. The death was due to antimony poisoning, and he estimates that 2,000 persons are killed by antimony poisoning every year in Egypt. Since tartar emetic is largely used in treatment the author disagrees with the suggestion advanced by Khalil of examining the urine for pyrocatechin (contained in fouadin) as a measure of tolerance. It is also not certain that the proportions excreted by bowel and kidneys are constant. The author advises that no more than four antimony injections be given, in all amounting to 0·18 gram of antimony, and thereafter emetine should be administered.

Gminder (p. 220) suggests that fouadin may have the effect of lessening the clotting power of the blood and that therefore operations should not be performed until at least four weeks after the completion of a course of this drug.

Serra (p. 219) reports good results in the treatment of 15 cases of intestinal and vesical schistosomiasis by dicuprene intravenously, paludex orally and a combination of the two, but prefers oral paludex. Cawston (p. 599) failed to cure two patients by administering cuprochin by the mouth.

Khalil and Azim (p. 665) show that the introduction of perennial irrigation in Egypt has resulted in an enormous increase in the number of infections by *S. haematobium*. Canals are now to be cleaned yearly, outflows to drains are to be made and dead ends abolished. Buchanan

(p. 594) shows that mechanical pumping of water into irrigation canals in Egypt tends to ensure a continuous supply of snails into them, and results in the over-watering of the canals and the creation of a sluggish current. On the other hand, the older methods of waterwheels or counter-balanced buckets, which are operated by man or animals, allow the canals to dry between waterings. The seasonal variation in vesical disease is apparently related to the falling of the Nile, which leaves pools and stagnant creeks, or to lowered resistance due to overwork, malaria or underfeeding. He (p. 595) holds that the first essential in prevention is the provision of wells, and the second is to find a suitable type of latrine. The key to the problem is sanitation rather than medication. In the Sudan (p. 266) the chief measures of control consist of the protection of canals against fouling, the provision of good deep wells and the treatment of cases. Villages should be placed not less than 300 metres from canals ; canals should be fenced ; latrines should be provided. The cooperation of the natives, however, still lags behind the efforts of the Government, and the influx of labourers from outside is a danger since it is difficult to examine and treat these people efficiently.

Khalil and Azim (p. 667) describe how the use of copper sulphate in a concentration of 5 parts per million acting for 5 days in streams and canals of an oasis, combined with a campaign of tarter emetic injections, eliminated new infections and caused Bulinus to disappear, though *Melania tuberculata* and *Limnaea truncatula* persisted. The area under cultivation, which can be taken as a measure of the working capacity of the inhabitants, increased by 25 per cent. as a result. In discussing water supplies Witenberg and Yofe (p. 600) show that chlorine is the only agent which can be depended upon in practice to kill the cercariae of schistosomes, and chloramine is its most effective form. Alum precipitation does not affect them and sand filtration will not hold them back. Ten minutes after chlorination the concentration of chlorine should be :—For gaseous chlorine 0·6 per million ; for sodium hypochlorite 0·42 ; for chloramine 0·22. The water should not be used for 30 minutes after chlorination.

Makar (p. 267) found coupled schistosomes in the wall of a gall bladder removed at operation in Egypt. This is believed to be the first time that bilharzial cholecystitis has been reported during life. Ova of *S. haematobium* were found in the urine and of *S. mansoni* in stool. Stein (p. 598) found schistosome eggs, believed to be terminal-spined, in the gall bladder and liver of a Bantu native in South Africa.

Scott (p. 596) considers the regularity of the output of eggs by *S. mansoni* to be constant enough to justify the use of the dilution egg count method as in studies of *A. duodenale*. The egg output is less variable when expressed as eggs per cc. of stool than as eggs per unit of time, usually *per diem*. Stoll's method was used. The figures quoted in the original abstract however indicate considerable variations between maximum and minimum findings in the same patient and in the relative frequency of eggs of *A. duodenale* and *S. mansoni*.

Dowdeswell (p. 595) considers that *Planorbis stanleyi* Smith is the intermediate host of *S. mansoni* in Central Kavirondo, Kenya.

van den Berghe (p. 219) shows that *S. mansoni* may not be limited to the network of the inferior mesenteric vein. Solitary females may be found alone in the veins near the bowel, but in the liver solitary males are more common. Paired worms are found in the large mesenteric arches, and the worms may inhabit any part

of the portal system. PONS (p. 597) believes that there are two types of infection with *S. mansoni*, hepatosplenic and intestinal, with an initial stage common to both. This consists of a febrile reaction with abdominal symptoms, cough and eosinophilia. The second stage is chronic and the pathological reaction is fibrosis. In the intestinal type there are dysenteric episodes with enlargement of the liver and spleen. In the third stage, that of cirrhosis, the hepatosplenic form cannot be distinguished from Banti's disease and the intestinal form tends towards obstruction of the bowel. PERDOMO HURTADO (p. 598) reports the case of a boy with cysts of *E. histolytica* and eggs of *S. mansoni* in the stool and enlargement of the liver. Emetine and yatren were not effective in four days, but under fouadin the condition quickly improved.

KOPPISCH (p. 268) describes *S. mansoni* infection in the rabbit and rat. The changes are not the same as those in man, but this may be due in part to the fact that the animals were given a single infection, whereas man is usually subjected to repeated infections.

MÜLLER and TESCH (p. 218) report the first autochthonous case of infection with *S. japonicum* in the Celebes. WU (p. 597) finds that in China cattle are significant in the spread of *S. japonicum*. For oxen an average of 12·6 per cent. and for buffaloes 18·7 per cent. were found infected by liver examination.

TUBANGUI and MASILUÑGAN (p. 594) found that the sera of various vertebrates (except cat and rabbit) possessed marked cercaricidal properties against the cercariae of *S. japonicum*; the titres of warm-blooded known hosts were low, those of susceptible cold-blooded vertebrates high. The titre of the serum of infected guineapigs was much higher than that of normal guineapigs.

CHU (p. 268) states that *S. japonicum* is the cause of about 20 per cent. of cases of cirrhosis of the liver in Nanking. Moderate anaemia is common and high eosinophilia and leucocytosis are important in diagnosis. Tartar emetic is the most useful drug, fouadin is only effective in very large doses and neostibosan is useless.

Other Trematodes.—HUECK and WEN HUAN HUI (p. 601) report that of 24 persons infected with *C. sinensis* and treated with fouadin 10 became negative for ova. SHIMIZU and KAWADA (p. 269) report that in Japan measures for the prevention of infection by *C. sinensis* include the keeping of ducks infected with *Notocotylus attenuatus*. These infect snails (*B. striatulus japonicus*) and render them sterile. In two villages the numbers of snails have markedly decreased as the result of the application of this measure during several years. Again, paradise fish destroy the snails and are bred for that purpose, and further measures include health propaganda by lectures and cinematograph displays.

LA RUE and AMEEL (p. 220) show that the normal definitive host of Paragonimus in North America, the mink, has disappeared from many parts of its former range as the result of trapping. The crayfish is present over a large part of the same range, however, but the snail *Pomatiopsis lapidaria* is still unknown from a large part of the area occupied by mink and crayfish, and it is the snail which is evidently the most important factor in limiting the distribution of Paragonimus.

MORI (p. 220) traces the course of *P. westermanii* in experimental animals used as definitive hosts and believes that larvae pierce the small intestine, penetrate the diaphragm (through the liver if necessary) to the lungs, pulmonary vessels or bronchi. Some may reach the

lungs by the blood stream. WANG and HSIEH (p. 602) find that the X-ray appearances of paragonimiasis are multiple, fairly well circumscribed, usually isolated patches of infiltration in various parts of the lung field. They provide presumptive evidence only, but when found in cases in which there is an atypical history of tuberculosis with sputum negative for tubercle bacilli, paragonimiasis should be suspected even if no ova are found.

AFRICA *et al.* (p. 601) report the finding of *Heterophyes brevicaeca* and *Monorchotrema taihokui* in scrapings of the intestine from a dead Filipino. Eggs were found in the myocardium and spinal cord. The authors also report heterophyid eggs in the heart muscle in another case, and a cellular response typical of that condition but without eggs in a third. Adults were found in the intestine and eggs in the calcified mitral valves of both of the latter. ALICATA and SCHATTENBURG (p. 601) in Hawaii describe a case of infection with a heterophyid *Stellantchasmus falcatus*; the fresh water mullet *Mugil cephalus* is probably an intermediate host.

KUANG WU (p. 221) reports that metacercariae of *Fasciolopsis buskii* have been found on two new plants, *Salvinia natans* and *Spirodela* (*Lemna*) *polyrhiza* which are common in the endemic area of Chekiang. WU (p. 269) found that *F. buskii* developed to maturity in pigs and rabbits and that immature worms were present in dogs and a young buffalo after feeding with cysts; other animals tested were apparently resistant. Only one of over 200 children affected with *F. buskii*, examined by McCOY and CHU (p. 221), was found to be suffering from the classical symptoms of diarrhoea, distended abdomen, oedema of the face and stunted development; hexylresorcinol treatment (doses 0·4 to 1 gm.) resulted in the disappearance of eggs in 54 per cent. Calculations of the estimate made of the numbers of worms, based on egg counts, are criticized by LANE.

BRUG and TESCH (p. 218) found ova indistinguishable from those of *Echinostoma ilocanum* in 47 per cent. of 98 samples of faeces in the Celebes. SKRJABIN (p. 759) reports infection of a patient with *Echinostoma paraulum*, the first to be reported in man.

Cestodes.

Experimenting on himself, TARASSOV (p. 270) found that after swallowing 7 plerocercoids of *D. latum*, 7 heads were subsequently expelled. Fifteen months later he swallowed 6 plerocercoids, later expelling two heads. After an interval of one year he swallowed 7 and a year later 6, all without infection, but from 6 more swallowed after another year, 4 heads were expelled. After these various expulsions the passage of onchospheres and segments ceased in all instances. He therefore considers that infection with *D. latum* gives rise to immunity lasting 2 or 3 years but not longer and findings in the inhabitants of a village support this opinion.

In the *Journal of the American Medical Association* (p. 759) it is stated that the process of kippering does not kill the plerocercoid larvae of *D. latum*, but saturation with brine is fatal after a month if penetration is thorough. Ordinary smoking is ineffectual but "hot smoking" for one hour or more at 75°C. is fatal.

MUELLER (p. 667) gives the features which differentiate *Diphyllobothrium mansonoides* from *D. mansoni*; these cannot be abstracted. He points out that in the widespread areas in the United States where this worm afflicts native wild-life, man must be constantly exposed to

infection through drinking water from natural sources. Infected Cyclops are widely scattered.

KELLER (pp. 223, 602) treats ocular sparganosis with intravenous novarsenobenzol with excellent results. The dose is 30 cgm. for adults and two to six doses are given at 4 or 5 day intervals. This should not be exceeded.

In the southern U.S.A., SUNKES and SELLERS (p. 225) report that of 7,249 tapeworm findings in man, 98·6 per cent. were *H. nana*, *T. saginata* occurred 58 times, *H. diminuta* 32, *T. solium* 8, *D. latum* once and *D. caninum* once.

DAMMIN (p. 602) gives details of a method of staining with picric acid and preparing tapeworm proglottids for preservation in such a way as to make clear the outline of the uterus.

PENFOLD *et al.* (p. 604) have succeeded in hatching the ova of *T. saginata* by artificial gastric digestion followed by artificial pancreatic digestion.

PENFOLD *et al.* (p. 224) found that some onchospheres of *T. saginata* were viable if kept in normal saline at 2°C. to 5°C. for 13½ weeks; or in the saline for 9 weeks and then exposed on pastures for 8 weeks in mild conditions; or kept on dry pastures for 14½ weeks; or dry for 2 days under laboratory conditions. If dried in normal saline, *i.e.*, in salt solution becoming progressively stronger, however, none was alive after one day.

SANDGROUND (p. 676) treated 16 patients with tapeworm with carbon tetrachloride in a dose of 4 cc. The parasites were eliminated in 12, 3 were not followed up properly and 1 vomited the drug. Hexylresorcinol and tetrachlorethylene may have greater taenicidal value than the results of a small reported investigation indicate. LANE however [who has stated that 1·55 cc. of carbon tetrachloride may be fatal] points out that the dosage used by Sandground is even greater than that which proved fatal to two patients with Trichuris infection reported on p. 675, and that to evaluate an anthelmintic, a large series of patients should be followed up.

MAPLESTONE and MUKERJI (p. 283) found three recurrences in 13 patients treated for Taenia infection with tetrachlorethylene.

KRAYER (p. 604) recommends pumpkin seeds for the expulsion of tapeworms and gives details of the preparations.

MAPLESTONE and BHADURI (p. 224) comment on the rarity of cysticercosis in Indians in comparison with British troops. Pigs are frequently infected. They suggest that Indians may have an enhanced resistance to infection by the onchosphere and that the strobiles may on occasion be digested, so freeing the eggs, in cases of cysticercosis without strobiles, as is the case for *D. latum*. LANE suggests that air convection is a factor.

RAO (p. 225) considers that cysticercosis of the brain (although X-ray was negative) might have been the cause of jerking movements of one arm in a patient in India. A cysticercus was found in the other arm.

CASTELLANI (p. 225) describes a condition in which small nodules of fibrous tissue, with no sign of cysticercus, occurred in 3 patients with positive Wassermann reactions. They had been diagnosed as cysticercosis but cleared up under antisyphilitic treatment.

NARIHARA (p. 270) reports *H. diminuta* infection of a child in Taihoku city.

Bacigalupo (p. 668) names *Embia argentina* as a new intermediate host of *H. diminuta*. Scott (p. 668) gives a list of other insects in which cercocysts have been seen.

Zimmermann (p. 605) suggests that the dog flea *Ctenocephalus canis* is probably the intermediate host of *Dipylidium caninum* and the dog louse *Trichodectes canis* that of *D. sexcoronatum*.

Sami (p. 603) reports 26 cases of hydatid cyst in the Punjab and details the habitats. In 156 local dogs, 45 showed *Echinococcus granulosus* and the infection rate in herbivores was 1 per cent. in sheep and goats and 150 of 168 cattle.

Dungal (p. 603) reports a hydatid cyst in the left ventricle of the heart with perforation into the pericardium. Death was due to carcinoma of the stomach. It is suggested that hexacanth embryos may reach the coronary arteries via the patent foramen ovale, where this exists, in hydatid infestation of the heart.

Ymaz Apphatie (p. 223) describes techniques for separating toxalbumin and anatoxin from hydatid fluid. The albuminoid fraction gives stronger intradermal reactions and possesses higher specific antigenic potency than the saccharide fraction or the pure fluid.

de Waele and de Cooman (p. 604) report on the experimental infection of various animals with hydatid in Belgian Flanders. It is found mainly in the horse.

C. Wilcocks.

[*To be continued.*]

HELMINTHIASIS.

Précis of Abstracts in this Section.

Nastasi (p. 618) has investigated the incidence of schistosomiasis and the larval hosts in Libya. Zavattari (p. 618) reports that schistosomiasis, both vesical and intestinal, is more widely spread in Abyssinia than was thought, and urges further investigation.

Martins and Dos Anjos (p. 618) report an infection rate of 85·18 per cent. with *S. mansoni* in a little town in Minas Geraes, and of 28·73 in the whole area. Cawston (p. 619) contends that the shape of schistosome eggs is of value in promoting adhesion to mucus or faeces, so preventing drying before they reach water. Hoffman (p. 619) failed to infect *Planorbis corneus* with the miracidia of *S. mansoni*.

El Gazayerli (p. 619) reports finding a healthy male schistosome in a branch of the left coronary artery. Hassan (p. 619) investigated the spectroscopic changes in the serum in schistosomiasis. Cawston (p. 620) points out the importance of examining whole urine, of not using a cystoscope in untreated persons, and of using filtered and sterilized solutions of tartar emetic in schistosomiasis.

Mainzer (p. 620) shows that there is a great discrepancy between the clinical findings and the X-ray appearances of the lungs in schistosomiasis. The latter consist of distinct foci, increased striation and intensified hilar shadows. There may be symptoms suggesting tuberculosis, pulmonary fibrosis or asthma. He (p. 620) regards an increase in blood eosinophilia under antimony treatment in a doubtful

case as favouring the diagnosis of schistosomiasis. KENAWY (p. 620) reports two cases in which venous hum in bilharzial cirrhosis of the liver was associated with a probable connexion between the portal and systemic systems.

ASHKAR (p. 621) treated 24 patients with anthiomaline with considerable success. He gives details of dosage and of the various effects produced by the drug. IMPALLOMENI (p. 621) reports favourably on intravenous stibional B in the treatment of schistosomiasis. DIAMANTIS (p. 622) urges mixed antimony and emetine treatment in comparatively small doses. KUNERT (p. 622) used provocative injections of germanin, after courses of sodium antimony tartrate, to stimulate the passing of eggs and so test the value of the original treatment. DAVID (p. 622) failed to free the urine from schistosome eggs by the use of dicuprene and cuproquine.

MIYAJIMA (p. 623) advises the use of 1 per cent. quicklime in the water of ditches, and of a steam jet in mud for the destruction of *Oncomelania nosophora*, the host of *S. japonicum*. MARTINS and VERSIANI (p. 623) in view of the increase in *S. mansoni* infection in Belo Horizonte advise the examination of all inhabitants, the treatment of the infected, the construction of latrines and the provision of a sanitary service.

KOBAYASHI and YUMOTO (p. 624) describe abnormalities in *C. sinensis*. NIETO ROARO and CABALLERO (p. 624) discuss the possibility of the adaptation of imported *C. sinensis* to alternative hosts in Mexico, where Bithynia are not found. MUTO (p. 624) records a new fresh water fish intermediate host of *C. sinensis*.

KINUGASA (p. 624) reports favourably on the use of fouadin in *C. sinensis* infections. CHU (p. 625) found that *in vitro* and in a concentration of 1 in 40,000, which approximates to a possible concentration in the blood, gentian violet, malachite green and Nile blue killed *Clonorchis sinensis* within 24 hours. Gentian violet was the most effective, and this result supports previous work in experimentally infected animals.

ERHARDT (p. 625) investigated the effect of osmotic pressure and changes in *p*H on Opisthorchis. AFRICA (p. 625) mentions various Haplorchis flukes from the Philippines.

AZIM (p. 626) shows that heterophyids are found in 59 to 75 per cent. of dogs and 90 per cent. of cats in Egypt.

BACIGALUPO (p. 626) shows that *Limnaea viatrix* is an effective host of *F. hepatica* in Cuba. BÜRGI (p. 626) records a child with infection by *F. hepatica*. MANCEAUX and ALCAY (p. 626) show that infection with *F. hepatica* simulated appendicitis in one patient. Eosinophilia of 21 per cent. led to examination for eggs. KOURÍ *et al.* (p. 626) use emetine with success in the treatment of *F. hepatica* infections. *C. sinensis* infections are common among Chinese in Cuba.

BUCKLEY (p. 627) reports that *F. buskii* and *Gastrodiscoides hominis* are common in man in Assam. *Segmentina trochoideus* is an intermediate host of *F. buskii*.

KINUGASA (p. 627) details the symptoms found in a series of children infected with Paragonimus.

VAN DEN BERGHE *et al.* (p. 628) report that *Dicrocoelium dendriticum* eggs have been found in two Europeans in the Congo, and in monkeys, but not in the natives, who cook vegetables well, before eating.

C. W.

NASTASI (Antonino). Schistosomiasi e malacofauna nel Sahara Libico (Fezzàn e Gat). [**Schistosomiasis and Snails in the Libyan Sahara (Fezzan and Gat).**]—*Policlinico.* Sez. Prat. 1938. Oct. 17 & 24. Vol. 45. Nos. 42 & 43. pp. 1907–8, 1911–15; 1951–2, 1955–6, 1959–61. With 1 map. [16 refs.]

An investigation further determining the local incidence of schistosomiasis and the snail hosts in detail in Fezzan and Gat.

The map makes clear the places where infection with *S. haematobium* has been detected and where *Bulinus contortus* has been found. *Planorbis pfeifferi* was present at Gat in the extreme southwest of the area in question but infection with *S. mansoni* seems absent. Very probably the nature of land or water, it is felt, is inimical to Planorbis. [See also this *Bulletin*, 1934, Vol. 31, p. 773.]

Clayton Lane.

ZAVATTARI (Edoardo). I problemi sanitari dell'Impero: schistosomiasi e malacofauna nell'Africa Orientale Italiana. [**Sanitary Problems of the Empire; Schistosomiasis and Snails in Italian East Africa.**]—*Ann. d'Igiene.* 1938. Sept.–Oct. Vol. 48. No. 9–10. pp. 573–582. [23 refs.]

After a consideration which is confessed as necessarily incomplete, there is urged the need for determining the local distribution of the schistosomes, of their manifestation as urinary or intestinal parasites, and of their respective snail intermediaries. Before the recent war the only place in which there was certainly endemic vesical schistosomiasis was the lower valley of the Shebeli; there were a few doubtful cases reported elsewhere, but intestinal schistosomiasis had never been diagnosed. During the war it became clear that vesical infection was wider spread and that the intestinal form was important, but the environmental conditions determining its presence were unknown and these have to be ascertained in the interest of all inhabitants. *C. L.*

MARTINS (A. Vianna) & DOS ANJOS (W. Versiani). "Schistosomose mansoni" no norte de Minas Geraes. [**Mansonian Schistosomiasis in the Northern Part of the State of Minas Geraes, Brazil.**]—*Brasil-Medico.* 1938. Sept. 3. Vol. 52. No. 36. pp. 812–816. English summary.

"The area surveyed included eight municipalities. In all of them the disease was found, in percentages varying from 3·22 to 85·18. This last one, which the authors believe to be the highest ever recorded in the medical literature, was found in the little town of Fortaleza (Minas Geraes). The incidence of the disease in the area surveyed, considered as a whole, was of 28·73 per cent. The authors believe that the disease was recently imported from the north-eastern region of Brazil."

The technique used was concentration by sedimentation following HOFFMAN, PONS and JANER using two grams of faeces, which method is held to be optimum for the disclosure of schistosome eggs but inferior to that of Willis for others. In the 348 faeces examined by it the percentages of infection disclosed were—*A. lumbricoides* 41·12, *S. mansoni* 28·73, *N. americanus* 18·01, *S. stercoralis* 13·70, *T. trichiura* 6·72, *H. nana* 1·07, *E. vermicularis* 0·26 and Taenia sp. 1·34.

C. L.

CAWSTON (F. Gordon). **Variation in the Shape of Schistosome Ova.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 553–554.

An explanation, on the ground of advantage to the species, of the various shapes of schistosome ova.

The elongated flattened eggs of the schistosomes of cattle will by their shape adhere readily to mucous discharge if they have come from the nose, or to faeces if they have come from the bowel, and this adhesion will lessen the risks of their drying before they reach water; and the lateral spine of the egg of *S. mansoni* will similarly anchor it to faeces. The miracidium of *S. japonicum* gets into an operculated mollusc inhabiting rice fields and capable of surviving long periods of drying, so the egg has no need of a spine or special shape. [The reasoning seems to refer to eggs of the last passed directly into water overlying a ricefield.] *C. L.*

HOFFMAN (W. A.). *Planorbis corneus* **not an Intermediate Host of** *Schistosoma mansoni*.—*Puerto Rico Jl. Public Health & Trop. Med.* 1938. Sept. Vol. 14. No. 1. pp. 24–25. [Spanish version pp. 26–27.]

Planorbis corneus has been introduced through New Jersey into Porto Rico for use by fish fanciers in their aquaria in place of *P. glabratus* which carries schistosomiasis. All attempts during the last year to infect *P. corneus* with the miracidium of *S. mansoni* have failed. This is evidenced by the fact that continuous watching under the microscope of tentacles and head of a snail attacked by many miracidia has failed to show penetration in any instance, that none of the snails passed cercariae, and that dissection of the liver showed no sporocysts. Yet this snail carries avian trematodes in the Old World and some of these might find it a suitable host in Porto Rico. *C. L.*

EL GAZAYERLI (Mounir). **Unusual Site of a Schistosome Worm in the Circumflex Branch of the Left Coronary Artery.**—*Jl. Egyptian Med. Assoc.* 1939. Jan. Vol. 22. No. 1. pp. 34–37. With 1 fig.

The worm was discovered because that part of the heart in which it lay happened to be chosen for sectioning. It was a healthy male free in the lumen, and the wall of the artery where it lay was healthy. The foramen ovale was closed. The man, aged 24, died of suppurative meningitis of brain and spinal cord, and had had no cardiac symptoms. There were bilharzial lesions in lungs, rectum, appendix, and the urinary organs, and scrapings from rectum, bladder and seminal vesicles revealed only eggs of *S. haematobium*. *C. L.*

HASSAN (A.). **The Ultra-Violet Absorption Spectra of Sera in Human Schistosomiasis.**—*Jl. Trop. Med. & Hyg.* 1939. Jan. 16. Vol. 42. No. 2. pp. 17–18. [13 refs.]

"It seems, therefore, from our spectographic investigation, that the fundamental difference between schistosomiasis sera and normal ones lies in the former usually exhibiting a greater intensity. We suggest that this deviation in the absorption spectra is probably due to some changes in the relative amounts of the constituents of the serum proteins."

C. L.

CAWSTON (F. Gordon). **The Importance of Pathology and Dispensing in Schistosomiasis.**—*Jl. Trop. Med. & Hyg.* 1939. Apr. 1. Vol 42. No. 7. pp. 98–99.

Three practical points are brought out. Urine sent for microscopic examination must be whole urine, as Cawston has seen a nursing sister carefully decant the supernatant urine which had stood overnight into a bottle too small to take all the specimen, so that the pathologist did not get the essential part. A cystoscope should not be passed in untreated persons, for there are few bacterially infected cases which may not be traced to such a passage. A filtered and then sterilized solution of tablets containing tartar emetic and sodium chloride is far less likely to produce coughing on intravenous injection than is an unfiltered one. *C. L.*

MAINZER (Fritz). **Clinical Aspects of Pulmonary Diseases induced by *Schistosoma haematobium* and *mansoni*.**—*Jl. Egyptian Med. Assoc.* 1938. Dec. Vol. 21. No. 12. pp. 762–795. With 3 figs. [19 refs.]

"In this condition as in no other pulmonary disease there is mostly a striking discrepancy between the smallness of the clinical findings (obtained by percussion as well as auscultation) and the intense changes of the lungs shown by X-rays."

The X-ray types of pulmonary bilharziasis whether with *S haematobium* or *S. mansoni* are these: distinct foci varying in size, density and distribution; increased striation; enlarged and intensified hilar shadows. There may be cough, fever and wasting simulating tuberculosis and, after treatment has killed all parasites, contracting fibrosis may narrow bronchioles and pulmonary arteries with the respective sequelae. On the other hand there may be an allergic bronchial asthma having no such relationship, as the other effects have, with the habitat of the worms. [See also this *Bulletin*, 1938, Vol. 35, p. 665.] *C. L.*

MAINZER (F.). **Reactional Increase of the Eosinophil Proportion of the Blood in Schistosomiasis subsequent to Antimony Treatment: a Phenomenon in Support of the Recognition of Latent Infection.**—*Jl. Trop. Med. & Hyg.* 1939. Mar. 15. Vol. 42. No. 6. pp. 86–89.

In infections both with *Schistosoma haematobium* and *S. mansoni* there is apt to occur an increase in the blood eosinophilia under treatment with antimony. In doubtful cases a rise of this sort under antimony treatment favours a diagnosis of schistosome infection, though a failure of such a rise to take place does not exclude the infection. *C. L.*

KENAWY (M. R.). **Venous Hum in Bilharzial Cirrhosis of the Liver.**—*Lancet.* 1939. Apr. 8. pp. 821–822. With 1 fig.

Continuing on the subject indicated in the title [see this *Bulletin*, 1937, Vol. 34, p. 864] Kenawy reports two cases in which this hum,

usually strictly localized, was associated with a slight epigastric swelling which on light pressure of the finger yielded a thrill and of the stethoscope a murmur—both disappearing on heavier pressure. Its presence is believed to point to a connexion between systemic and portal systems. *C. L.*

Ashkar (M. F.). **Treatment of Schistosomiasis with Anthiomaline (a Preliminary Report).**—*Jl. Egyptian Med. Assoc.* 1938. Sept. Vol. 21. No. 9. pp. 614–619.

Report on 24 patients with urinary schistosomiasis treated intramuscularly with antimony thiomalate of lithium in a 6 per cent. solution.

Injections into dogs showed anthiomaline to be more toxic than fouadin as 3 to 2. Injections into 2 men in doses increasing from 1·25 to 4·5 cc. showed dead ova after giving 35·25 and 24·75 cc. respectively. Injections of 1 cc. gave rise to thirst, headache, joint pains and a feeling that the teeth were loose, but pulse, temperature and blood pressure were unchanged. Seven patients had twelve injections, given every other day, of 1·5 and 3 cc. and then ten of 4·25 cc.; living ova ceased to be passed after giving 21·5 to 55·5 cc.; in one patient dysenteric symptoms came on but were disregarded and disappeared, in another abdominal pain and vomiting were present after the ninth and tenth injections, but on the dose being reduced to 4 cc. they disappeared. The pain of the injections was very slight and the only other change noted was an increase in eosinophilia. All these treatments were on in-patients. Next, 10 out-patients were treated, one ceased to attend, the rest had every other day maximum doses of 1 cc. for every 15 kilos of body weight, this maximum as before being reached at the third injection. In 8 of them the ova disappeared or died after from 6 to 9 injections, in the remaining patient they were still living after the ninth injection; 4 of the 9 had vomiting, pain or headache. In the last series there were 5 daily doses and then others every other day (the dose being unstated) till the results were negative, as they were after between 8 and 11 injections, no symptoms being noted throughout. *C. L.*

Impallomeni (Rosario). Di un nuovo preparato di antimonio nella cura delle schistosomiasi umane. [**A New Antimony Preparation in the Treatment of Schistosomiasis of Man.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. June. Vol. 19. No. 6. pp. 370–376.

Stibional B, a pentavalent antimony preparation has been given with satisfaction to 20 persons with urinary schistosomiasis and to one with intestinal infection.

The drug is given intravenously in doses of 2·4, 5 and 10 cc. for the first three days, treatment is omitted on day four, and continued in 10 cc. doses on days 5, 6 and 7 and beyond this if need be. It is apt to produce fever which ceases on suspending treatment. Haematuria rapidly disappeared, the miracidium died and subjective symptoms improved. *C. L.*

Diamantis (A.). La mort subite en stibiothérapie antibilharzienne et les deductions chimiothérapiques qui en decoulent à propos du " Fouadin Tolerance Test " du Prof. Khalil Bey. [**Sudden Death in the Treatment of Schistosomiases by Antimony and Chemotherapeutic Deductions arising therefrom as to Khalil's Fouadin Tolerance Test.**]—*Rev. Prat. Malad. des Pays Chauds.* 1938. Nov. 30. 17th Year. Vol. 18. No. 13. pp. 599–604, 607–8, 611–12.

Diamantis once again [see this *Bulletin*, 1938, Vol. 35, p. 599] stresses the sudden and unforeseen character of the many antimony deaths in Egypt, the practical inadequacy of Khalil's fouadin tolerance test, and the necessity of giving a mixed antimony and emetine treatment in quantities which are below the lethal dose of each. *C. L.*

Kunert (H.). Ein Nachweis zur Dauerheilung der Bilharziosis haematobia durch Injektion von Germanin (Bayer 205). [**The Duration of Cure of Infection by** *S. haematobium* **indicated by Injection with Germanin.**]—*Zent. f. Bakt.* I. Abt. Orig. 1939. Feb. 20. Vol. 143. No. 3/4. pp. 161–164.

Writing from what is described as being at, or for, the time (zur Zeit) Tanganyika Territory, Kunert treated 45 persons from 12 to 15 years of age with intravenous injections of sodium antimony tartrate, each of 0·12 gram for the young and 1·44 gm. for adults. He aimed at giving 12 of such injections, three a week, but did not succeed in doing so in six of the younger patients, but when a month later 33 of these patients were re-examined, the urinary deposit showed dead eggs only. He then gave provocative injections of Germanin 2 and 5 months later; after the first, living eggs were passed by the six in whom 12 injections had not been given (the numbers given had been 5, 6, 6, 6, 6 and 7) and by no others; after the second provocative injections no living eggs were passed, but they included none of the six who had had short treatments. *C. L.*

David (J.). Note sur l'emploi des sels de cuivre: Dicuprène et Cuprochine dans la schistosomiase urinaire. [**Salts of Copper, Dicuprine and Cuproquine, in Urinary Schistosomiasis.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 377–380.

Neither salt freed the urine of schistosome eggs.

Dicuprene (cupro oxyquinoleine disulphonate of diethylamine) was given intravenously without incident in doses of 5 cc. daily, with total dosage of 25 cc. to 65 cc. Cuproquine (sodium cupro oxyquinoleine sulphonate) was given by mouth to children, by nuns, according to weight, but without progressive increase in the doses, in totals of 6 to 15 grams, but of the actual doses it is merely said that they were 0·2 gram greater than those given by van Nitsen [this *Bulletin*, 1937, Vol. 34, p. 800]; the children's general condition was improved. The contrast with van Nitsen's results in intestinal infection is emphasized. *C. L.*

MIYAJIMA (Mikinosuke). **On the Prevention of Schistosomiasis in Japan.**—*Jl. Public Health Assoc. Japan.* 1938. Nov. Vol. 14. No. 11. pp. 1–6.

The measures advised for prevention of schistosomiasis are those which have stood the test of local experience.

More than three-quarters of the registered deaths which take place in Japan from this infection are reported from the Yamanashi Prefecture. Up to 1925 there were in the country about 100 deaths a year, from 1930 to 1934 they have averaged rather less than 70. The intermediate host *Blanfordia* [*Oncomelania*] *nosophora* being a snail which lives partly in water and partly in soil, the attack on it is twofold. In water quicklime which is cheap works well. At a strength of 2 per cent. it destroys the snail in 10 hours, at 1 per cent. it is uncertain but apparently it is held to be effective in 24 hours, for the advice is that a ditch in which the snails are present should be dammed up for that time and quicklime put in to bring its strength up to 1 per cent. For the snails in mud the edges of paths and the weedy parts of emptied ditches should have a steam jet thrown on them. After these methods were used the percentage of schistosome egg carriers, which had before been 19·8, fell by two years to 7·9, by four years to 5·6 and by 6 years to 4·4. But *B. nosophora* began to appear again after four years, and it is advised that the campaign against them should be repeated every ten years [which seems inadequate if the snails reappear in *four* years]. *C. L.*

MARTINS (Amilcar Vianna) & VERSIANI (Waldemar). Plano de combate á "Schistosomose mansoni" em Belo-Horizonte. [**A Plan for fighting Schistosomiasis in Belo Horizonte.**]—*Hospital.* Rio de Janeiro. 1939. Mar. Vol. 15. No. 3. pp. 563–570.

With an increase in the number of cases examined for Mansonian schistosomiasis from 151 in 1931 to 2,650 in 1938 there has gone an increase in detected infection from a percentage of 0 to one of 11·69.

The advised procedure is the examination of the faeces of all inhabitants by some concentrative method suitable to the eggs of the parasite, the treatment, and re-treatment as required, of all infected, the construction of latrines and a sanitary service. *C. L.*

OSAKA (Kiyosi). **Studies on the Biological Behaviour of the Cercariae of Schistosoma Japonicum. Part I. Observations on the Escape of Cercariae from their Snail Hosts.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Dec. Vol. 37. No. 12 (405). [In Japanese pp. 1952–1962. With 2 figs. [10 refs.] English summary pp. 1963–1964.]

GIOVANNOLA (Arnaldo). Osservazioni sui gasteropodi della Sardegna d'importanza medica e veterinaria. [**Medical and Veterinary Importance of the Gasteropods of Sardinia.**]—*Rendiconti Istituto di Sanità Pubblica.* Rome. 1938. Vol. 1. Pt. 2. pp. 506–517. With 11 figs. [11 refs.]

Kobayashi (H.) & Yumoto (Y.). **Some Studies on Abnormal Liver Flukes,** *Clonorchis sinensis.*—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Sept. Vol. 37. No. 9 (402). [In Japanese pp. 1474–1479. With 9 figs. on 1 plate. English summary pp. 1479–1481.]

The abnormalities consist of bulges and rents in the uterus with extrauterine eggs in the receptaculum seminis, excretory duct and bladder, in the parenchyma, in the oral sucker and in Laurer's canal, and a few elsewhere. *C. L.*

Nieto Roaro (Daniel) & Caballero (Eduardo). Nota acerca de la presencia de *Clonorchis sinensis* en Mexico. [**The Presence of** *Clonorchis sinensis* **in Mexico.**]—*An. Inst. Biol.* Mexico. 1938. Mar. & June. Vol. 9. Nos. 1 & 2. pp. 165–166. With 2 figs.

Certain persons returning to Mexico after living in China were found in 1937 to be passing ova of *Clonorchis sinensis*. The fact was reported to the Public Health authorities in fear of this parasite becoming disseminated. The same applied to Paragonimus. Though *Carassius auratus* (the second intermediate host of Clonorchis) is found in Mexico, the molluscan host, Bithynia, is not, nor are the crab-hosts of Paragonimus, so the danger is not pressing. Since, however, *Onchocerca volvulus* (says the author) became adapted to Mexican hosts, either introduction of the Chinese molluscs into Mexico or adaptation of the developmental stages of the Clonorchis to other, alternative, hosts might in time lead to spread of infestation by this trematode.

H. H. S.

Muto (S.). **A New Species of Fresh-Water Fishes which serves as a Second Intermediate Host of Liver Fluke,** *Clonorchis sinensis*, **in Formosa.**—*Taiwan Igakkai Zasshi* (*Jl. Med. Assoc. Formosa*). 1938. Oct. Vol. 37. No. 10 (403). [In Japanese pp. 1537–1539. With 1 fig. [12 refs.] English summary p. 1539.]

In the body of the paper and in the English summary this new second intermediate host is variously designated as Family Cyprinidae, Genus *Cultericuls* [? *Cultriculus*] (Oshima) or (Oschima), Species *Kneri* or *kneri* n. sp.; and in the Japanese title which clearly differs from that of the English abstract these names appear—*Cultericuls Kneri* (Kregenberg). [Moreover it is difficult to regard the generic name as conforming to the Latin form prescribed in the International Code of Zoological Nomenclature, but for that Muto seems in no way responsible.] *C. L.*

Kinugasa (M.). **On the Treatment of** *Clonorchis sinensis* **with Fuadin.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc Formosa*). 1939. Feb. Vol. 38. No. 2. [In Japanese pp. 290–294. [15 refs.] English summary p. 294.]

It appears from the English summary that patients ceased to pass Clonorchis eggs after two courses of Fouadin in unstated dosage. "Fuadin is therefore superior to the preparations of antimony that have hitherto been used, but it is regrettable that toxic symptoms often appear towards the latter half of the injection period." *C. L.*

Chu (H. J.). **Studies on *Clonorchis sinensis* in vitro. Part II. Action of Various Dyes.**—*Chinese Med. Jl.* 1938. Nov. Vol. 54. No. 5. pp. 409–415. [10 refs.]

"All *Clonorchis sinensis* specimens used for the experiments were adults obtained from experimentally infected rabbits and cats. The containers were Carrel flasks of the 3·5 type; the medium consisted of inactivated horse serum diluted with an equal amount of Ringer solution. The substance to be tested was added to the medium in different amounts so that each substance was examined in concentrations ranging from 1/2,500 to 1/400,000. A concentration of 1/40,000 was regarded as of special importance since it approaches most closely a concentration which might be used for treatment in vivo."

"Sixteen dyes belonging to four groups, Aniline, Phthaline, Acridine and Sulphonamide, have been tested in vitro with regard to their clonorchicidal action. The medium consisted of horse serum diluted with an equal amount of Ringer solution, to which the dyes were added in various concentrations. It was found that at a concentration of 1/40,000 which corresponds most closely to an eventual therapeutical concentration, Gentian violet, Malachite green and Nile blue sulphate killed *Clonorchis sinensis* within 24 hours. Of these three dyes, Gentian violet was the most effective. This result of in vitro experiments supports previous work on the effect of Gentian violet on *Clonorchis sinensis* in experimentally infected animals."

Erhardt (Albert). Der Einfluss der Wasserstoffionenkonzentration unter aeroben und anaeroben Bedingungen, des osmotischen Druckes und der Temperatur auf die Lebensdauer von Opisthorchis in vitro. [**The Influence *in vitro*, on the Life Span of Opisthorchis, of *p*H in Aerobic and Anaerobic Conditions, of Osmotic Pressure and of Temperature.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Jan. Vol. 43. No. 1. pp. 15–19. With 1 fig.

Opisthorchis, taken at once from the gall bladder of killed cats was used. In both aerobic and anaerobic conditions the flukes lived longest in *p*H 5·9 to 6·3; in aerobic conditions there was a second maximum at *p*H 7·6. Change in osmotic pressure and lowering of temperature affected the flukes little. *C. L.*

Africa (Candido M.). **Description of Three Trematodes of the Genus Haplorchis (Heterophyidae) with Notes on Two Other Philippine Members of this Genus.**—*Philippine Jl. Sci.* 1938. July. Vol. 66. No. 3. pp. 299–307. With 2 plates.

The Haplorchis flukes here described are—*H. calderoni* (Africa and Garcia, 1935) from the small intestine of dog, cat and man, *H. vanissima* n. sp. from the small intestine of man, *H. sisoni* n. sp. from the small intestine of cats and dogs experimentally, *H. taichui* (Nishigori, 1925) transferred by Chen from the genus *Monorchotrema*, and *H. yokogawai* similarly transferred by Chen and of which *H. pumilio* becomes a synonym. "During the writing of this paper several specimens of *H. taichui* were received from Palestine through the courtesy of Professor Witenberg, of Hebrew University, Jerusalem", but the locality of collection is unstated. *C. L.*

Azim (Abdel). Helminthes parasites des chiens et des chats en Egypte. [**Helminths of Dogs and Cats in Egypt.**]—*Ann. Parasit. Humaine et Comparée.* 1939. Jan. 1. Vol. 17. No. 1. pp. 32–36. [20 refs.]

Of these parasites the forms of most interest to human medicine are the heterophyids. They are found in 75 per cent. of dogs in Alexandria and 59 per cent. of those in Cairo, while 90 per cent. of cats are infected. *Dracunculus medinensis* has been found twice in the paws of dogs.

C. L.

Bacigalupo (Juan). *Fasciola hepatica.* Su ciclo evolutivo. [**The Developmental Cycle of** *F. hepatica.*]—*Rev. Med. Trop. y Parasit.* Habana. 1938. July–Aug. Vol. 4. No. 4. pp. 203–206. With 11 figs. on 3 plates.

The life cycle of *F. hepatica* in *Limnaea viatrix* is followed through with microphotographs, showing that this is an effective host in Cuba. *C. L.*

Bürgi (Kuno). Ein Fall von Leberdistomatose bei einem 4jährigen Kinde. (*Fasciola hepatica*). [**Infection of the Liver by** *F. hepatica* **in a Four-Year-Old Child.**]—*Schweiz. Med. Woch.* 1938. Nov. 19. Vol. 68. No. 47. pp. 1274–1277. With 1 fig. [18 refs.]

A boy of 4 who had been ill for three months came under observation with a diagnosis of a localized appendicular abscess. Examination showed in the stool eggs of Ascaris, Enterobius and *F. hepatica*, of which last statement a microphotograph leaves no doubt. The swelling in the right lower abdominal quadrant disappeared after emetine injections and a treatment with chenosan brought away 5 ascarids, but their eggs and those of Fasciola persisted, and his relations refused a proposed appendicectomy in the quiescent stage, nor would they bring him for subsequent examination. *C. L.*

Manceaux (A.) & Alcay (M.). A propos d'un cas de distomatose hépatique à *Fasciola hepatica.* [**A Case of Liver Infection by** *F. hepatica.*]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 169–172.

The eggs of *F. hepatica* were discovered in the faeces, and in the duodenal contents removed by a sound, from a woman of 26 who had thereby been saved appendicectomy for appropriately situated attacks of pain. An eosinophilia of 21 per cent. led to the examinations which discovered the eggs. She had been troubled for 3 years, the attacks persisting in spite of emetine, the eosinophils rising to 28 per cent. of 27,000 white cells presumably per cubic millimetre. *C. L.*

Kourí (Pedro), Basnuevo (José G.), Sotolongo (Federico) & Anido (Vicente). Estado actual de la distomatosis hepatica en Cuba. Su diagnóstico y tratamiento. [**Hepatic Distomiasis in Cuba : its Present Incidence, its Diagnosis and Treatment.**]—*Rev. Med. Trop. y Parasit.* Habana. 1938. July–Aug. Vol. 4. No. 4. pp. 185–202. [17 refs.]

The two liver flukes interesting medical men in Cuba are *Fasciola hepatica* and *Clonorchis sinensis*. *F. hepatica* has been known in the

local slaughterhouses from "time immemorial" and in human inhabitants since 1931. The clinical symptoms which have been seen in the infections are noted as are the pathological lesions, but a single faecal examination does not suffice to exclude the presence of infection. The specific treatment is emetine and it is believed that it poisons the fluke by its presence in the blood which the fluke swallows after the blood has escaped into the biliary passages. Its failure to cure is, it is suggested, due to the flukes being in such cases enclosed in fibrous capsules.

C. sinensis has been found in Chinese in Cuba in a percentage of 49 of those sick and in 23·53 of those killed in accidents. The lesions and treatment are briefly considered. *C. L.*

Buckley (J. J. C.). **Observations on** *Gastrodiscoides hominis* **and** *Fasciolopsis buski* **in Assam.**—*Jl. Helminthology.* 1939. Jan. Vol. 17. No. 1. pp. 1–12. With 1 map & 2 figs.

"*Fasciolopsis buski* and *Gastrodiscoides hominis* are recorded as common human infections in Kamrup District, Assam, where the examination of 221 faecal specimens from different localities gave an average infection rate of 59·7 per cent. with *F. buski* and 41·2 per cent. with *G. hominis*. In individual infections *G. hominis* may occur in very large numbers; 989 specimens were obtained on one occasion by means of soap water enemas which are effective in removing these worms. Attempts to find the snail intermediary of *G. hominis* experimentally and by dissecting snails for natural infections were unsuccessful. The egg and miracidium are described. A list of water snails found in the endemic areas is given As a result of experimental infections, *Segmentina trochoideus* is recorded as a new intermediate host of *F. buski*. A list of edible water plants which may possibly act as vehicles for the infective stages of the flukes in Kamrup is given."

C. L.

Kinugasa (M.). **Investigations on the Incidence of Lung Fluke Disease** (*Paragonimus westermani*) **in Sintiku Prefecture. I. On its Incidence in Primary School Children in Sintiku Prefecture.**—*Taiwan Igakkai Zassi* (*Jl. Med. Assoc. Formosa*). 1939. Feb. Vol. 38. No. 2. [In Japanese pp. 277–288. English summary pp. 288–289.]

Examination was made of the sputum of 46,322 Formosan Chinese and 2,671 Japanese school-children, with infection found in 0·64 per cent. of the first and in one child only of the second group. Taken school by school the percentage of infection varied from 0 to 6·25. All but three of the infected admitted eating fresh water crabs and the children of fishmongers were more often infected than were others. Age increased the rate. There was physical and mental deterioration, believed to be proportional to the weight of infection; the former showed itself by wasting, cough in 90 per cent., blood in sputum in 30 per cent., pains in the chest in 20 per cent., other complaints being incapacity for exertion and asthma; the latter was seen in lowered capacity for solving problems or original thinking, and poor memory. The table of contents wrongly refers to the infection as with *Clonorchis sinensis*. *C. L.*

VAN DEN BERGHE (L.) & DENECKE (K.). *Dicrocoelium dendriticum* (*Fasciola lanceolata*) chez l'homme et les singes au Congo Belge. [*D. dendriticum* **in Man and Monkeys in the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 509–514. With 1 plate. [17 refs.]

Eggs of *D. dendriticum* have been found in faeces of two Europeans in the Belgian Congo, probably the result of eating uncooked vegetables; but not in any of the negro inhabitants, who eat these well cooked. They have also been found locally in *Pan satyrus*, *Papio* and *Cercocebus*; and in one instance of each of the last two monkeys autopsy displayed a duodenal and not a biliary habitat. Local infection of sheep and snails remains to be sought for. *C. L.*

NEUHAUS (Walter). Der Invasionsweg der Lanzettegelcercarie bei der Infektion des Endwirtes und ihre Entwicklung zum *Dicrocoelium lanceatum*. [**The Infection of the Definitive Hosts by Cercariae of** *D. lanceatum* **and their Development.**]—*Ztschr. f. Parasitenk.* 1938. Oct. 17. Vol. 10. No. 4. pp. 476–512. With 14 figs. [18 refs.]

YELLOW FEVER.

Précis of Abstracts in this Section.

JAMES (p. 631) gives figures of reported cases in America and Africa and shows that all cases in South America in 1938 were of the jungle type, transmitted in the absence of *Aëdes aegypti*. Vaccination is at present the only practicable method of protection and for this purpose the culture virus strain 17D, which produces only slight reaction, has been used on over 1,000,000 persons. It has also been used in London.

The eastern boundary of the yellow fever area in the Sudan may extend into Abyssinia.

The Institut Pasteur of Brazzaville (p. 632) reports that the Brazza strain is the same as the Dakar strain. Protection tests show that yellow fever is widespread in the Province. There is probably some animal reservoir and infection may be transmitted by insects other than Aëdes, though once it is established in man Aëdes seems to be responsible for the typical epidemics.

SOPER (p. 633) points out that in South America, rural yellow fever transmitted by *Aëdes aegypti* and jungle yellow fever occurring in the absence of this mosquito are responsible for maintaining the non-urban endemicity. Control is based on viscerotomy, anti-*Aëdes aegypti* measures and vaccination. FINDLAY (p. 633) states that in both Africa and South America the sera of 20–25 per cent. of wild monkeys in endemic areas contain yellow fever immune bodies, and in America some species are very susceptible to infection. True jungle yellow fever has not yet been found in Africa. Both Findlay and Soper give figures of vaccination results, which are very satisfactory.

SCHÜFFNER (p. 634) uses a 10 per cent. suspension of virus in the mouse protection test instead of 20 per cent.

VAN DEN BERGHE (p. 634) found no immune bodies in 84 human sera from Ruanda-Urundi, but found one Colobus monkey positive in the Congo.

Nicolau (p. 635) considers the virus of yellow fever to be a small coccus which, by agglutination in the cells, form the characteristic inclusion bodies. Hindle, however, points out that filtration has shown the size of the particles of the virus to be between 18 and 27 μμ, *i.e.*, one-tenth of the limit of resolution of the visual microscope.

Findlay and MacCallum (p. 635) record spontaneous variation of a neurotropic strain of yellow fever virus, between the 670th and 750th passages in mouse brain, into one which gave lesions in monkeys characteristic of pantropic strains. The importance of testing the pathogenicity of strains for human immunization is stressed. Schüffner *et al.* (p. 636) have maintained a viscerotropic strain, which has remained true to type, in *M. rhesus* (alternately dried *in vacuo*), and in mice, for 405 subinoculations. Dried neurotropic virus kept *in vacuo* has been found to be still virulent after 5 years. da Fonseca (p. 636) has found the Asibi strain to persist up to 43 days in guineapig testes.

Höring (p. 636) finds that urea inactivates the virus, the effect depending on the urea concentration, virus dilution and duration of contact. The action of urea in human blood cannot be entirely denied, and this effect of urea suggests that the virus may be of a protein nature.

Whitman (p. 637) by experiments on the feeding of *A. aegypti* at material times on man and monkeys vaccinated with virus 17D, and on the immersion of larvae in strong suspension of the virus, concludes that there is little danger of the transmission of that virus by the mosquito. Similar conclusions are reached by Peltier *et al.* (p. 637) using a neurotropic strain which is employed for vaccination in West Africa.

Findlay and MacCallum (p. 638) discussing the possibility of the transmission of yellow fever by other arthropods, report that the virus persists for 15 days in the abdomen of the cockroach *Blatella germanica* and that monkeys may be infected by intra-gastric introduction of virus. It is well known that monkeys eat small insects.

Callot (p. 638) reports the finding of *Aëdes geniculatus* (a proved vector of yellow fever) in parts of France, and describes its breeding places. Roubaud *et al.* (p. 638) found that specimens of *Aëdes geniculatus* kept at 20°–22°C. (after an initial period of 5 days at 30°C.) for 18 and 22 days after feeding on blood containing yellow fever virus were not infective by bite though the virus had survived in their bodies. Bennett *et al.* (p. 639) demonstrated that *Aëdes triseriatus* is an efficient vector, but there is some evidence of attenuation of the virus in it.

Shannon (p. 639) describes methods for collecting and feeding jungle mosquitoes for use in experiments. Carnahan (p. 640) reports on mosquitoes trapped in Florida over a period of 2 years, most of which were Aëdes. He describes the traps used. Welch (p. 640) details the insects found in aircraft in Florida. No Aëdes were found.

Stevenson (p. 640) found the chief lesion in the nervous system in yellow fever to be perivascular haemorrhage in the brain. Changes in the nerve cells were insignificant and he considers that there was no definite evidence of neurotropism in this series. Montenegro (p. 641) describes the Councilman-Rocha-Lima cell and others which resemble it, subdividing these into "identifiable atypical" and "suspect-atypical."

VAN DEN BERGHE (p. 641) prefers a 20 per cent. suspension of virus to a 10 per cent. suspension in the intraperitoneal mouse protection test. Serum is diluted 1 in 7. Controls with both normal and immune serum are indispensable. He also (p. 642) discusses the diagnosis in a suspected case in the Congo.

JADIN and ARNALDI (p. 642) discuss an outbreak, in the Congo, which they conclude to have been of atypical yellow fever, though only 1 of the 17 patients gave a definitely positive mouse protection test.

ROSS (p. 643) points out that as the sampling of populations for the mouse protection test in Africa is as yet incomplete, certain areas are proclaimed as suspect by the Union Government. Aëdes control is so difficult that the disinsectization of aircraft is necessary. He describes the procedure at Durban, and discusses disinfection plants carried in the aeroplanes. The abstract should be read in full. In the *Public Health Reports* (p. 646) are given the regulations to be observed by air passengers in Florida, and HARGETT (p. 646) deals with the same subject. CUMMING (p. 647) describes in detail the possible harbourages for mosquitoes both inside and outside certain types of aeroplanes in America. The number of such places is too large for further abstract.

ROBINEAU (p. 648) recapitulates anti-yellow fever measures in Senegal.

In the *Bulletin de l'Office International d'Hygiène Publique* (p. 648) it is stated that the results of protection tests in domestic animals do not affect the specificity of these tests in man.

SMITH *et al.* (p. 648) describe the method of culture of strain 17D, and the procedures for preparation of the vaccine. Circulating virus may be found in the blood of those vaccinated up to the 10th day but was not found at any time in 17 of 29 men. Antibodies developed within 28 days in all the subjects tested. The minimum dose necessary for successful vaccination is between 14 and 140 m.l.d. for mice, and antibodies were still present after one year in a group tested. Reactions to this vaccine are mild. PELTIER (p. 650) gives figures which indicate the specificity of the mouse protection test for human sera, and of the results of vaccination with Laigret's phosphate vaccine and egg vaccine which, judged by protection tests, give strong protection in 95 per cent. of cases. It may be advisable to repeat the vaccination every two years. DONOVAN (p. 650) reports on vaccination in America with virus attenuated by prolonged cultivation on media containing fowl embryo tissue. Reactions were slight.

FINDLAY *et al.* (p. 651) consider that the aetiological agent of infective hepatitis is a virus. This has been found contaminating pooled measles serum and the occurrence of jaundice following yellow fever immunization has been traced to a filterable hepatotoxic agent in the culture medium which contained apparently normal human serum. Pools of apparently normal serum should not be used unless the medical history of all donors can be followed for at least one month.

DA FONSECA and ARTIGAS (p. 652) give results of tests of susceptibility of various Brazilian wild mammals to yellow fever virus. These cannot be further abstracted. They (p. 653) found that two young cats were susceptible to intracerebral injection of neurotropic virus, whereas negative results had previously been obtained in Europe. DA FONSECA (p. 653) found the rodent *Ctenomys brasiliensis* to be very susceptible to neurotropic virus. *C. W.*

James (S. P.). Renseignements sur la fièvre jaune, reçus au cours de la période de neuf mois finissant le 30 septembre 1938. [**Information on Yellow Fever received during the Period of Nine Months ending September 30th, 1938.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Nov. Vol. 30. No. 11. pp. 2537–2541. With 1 map.

Cases of yellow fever notified during the nine months ending 30th September, 1938, are indicated in the following table :—

South America.

Country	State	No. of localities with cases	No. of cases	No. of deaths
Brazil	Minas Geraes ...	43	—	161
	Pará	1	1	1
	Santa Catharina	2	—	23
	Rio de Janeiro ...	32	61	58
	São Paulo ...	5	20	—
	Federal District	2	2	2
	Cayna	1	12	3
	Amazonas ...	2	2	2
British Guiana ...	Rupununi District	Suspected jungle cases since beginning of the year		
	Georgetown ...	1	2	1
Colombia	Cundinamarca ...	5	12	12
	Santander ...	1	1	1
	Santander del Sur	1	1	1

Africa.

Belgian Congo ...	... ...	2	15	9
French Equatorial Africa	Oubanghi-Chari	1	1	1
French West Africa	Dahomey ...	1	1	1
	Ivory Coast ...	6	7	6
	Niger	1	1	—
	Senegal	2	2	1
	Sudan	1	1	1
British West Africa	Gambia	1	1	—
	Gold Coast ...	13	16	15
	Nigeria	4	5	4

The occurrence of yellow fever in British Guiana is of interest in view of the results of protection tests in Dutch Guiana [see this *Bulletin*, 1939, Vol. 36, p. 22]. Cases resembling jungle yellow fever are reported as occurring among the Indians in the Rupununi district, and 5 out of 46 sera gave a positive protection test.

In Brazil the disease has a very wide distribution and Dr. Soper is of the opinion that the 250 deaths during the first part of 1938 indicate

at least 15,000 cases of yellow fever. All the cases occurring in South America during 1938 belonged to the jungle variety transmitted in the absence of *Aëdes aegypti*.

It is evident, therefore, that at present vaccination offers the only practicable method of protection, and up to the end of September 1938, almost 1,000,000 persons had been vaccinated by the culture virus strain 17D. This vaccine produces only a slight reaction, and in at least 95 per cent. there is a certain degree of immunity after a week which increases up to the 20th day at least.

In London 3,500 have been vaccinated by the same method since September 1937, without any cases of jaundice having been observed, the previous cases probably being the result of an adventitious hepatotoxic virus present in the human serum used in making the vaccine suspensions. [See also FINDLAY *et al.* below, p. 651.]

Positive protection tests have been obtained with sera from the Anglo-Egyptian Sudan collected from natives in villages between the White Nile and the Abyssinian frontier, and this suggests that the Eastern boundary of the yellow fever area may extend into Abyssinia. It is also of interest that in Malakal during 1933 only one positive serum was found out of 50 examined, whilst in 1938, 21 out of 114 sera were positive. *E. Hindle.*

BRAZZAVILLE : AFRIQUE EQUATORIALE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1937 [SALEUN (G.)]. pp. 57–73. With 1 folding map.—Fièvre jaune. [**Yellow Fever.**]

An interesting summary of work on the epidemiology of yellow fever in French Equatorial Africa, including an account of the isolation of the virus from a European case of the disease occurring at Brazzaville by intracerebral inoculations of the blood into mice.

This virus, known as the " Brazza " strain, has now been passaged 29 times during 1937 and regularly produces paralysis on the sixth day. Cross-immunity tests showed the identity of this strain with that isolated at Dakar. Attempts to infect guineapigs showed the possibility of its becoming adapted in this animal ; a single experiment with a porcupine, *Athelura africana*, gave negative results.

In addition a certain number of protection tests were carried out in the villages and confirm previous observations supporting the view that yellow fever has a widespread distribution in this Province. Eighteen Europeans were examined and all gave negative results, including one subject who nine years previously was supposed to have had an attack of yellow fever.

Four persons vaccinated by Laigret's method three years previously were examined. One neutralized 640 mouse units and another 6,400 units ; the remaining two had completely lost any protective properties.

Four other persons vaccinated with virus and immune serum 18 months previously gave negative results in three cases, one only showing an immunity titre of 640 units.

Sero-protection tests with the blood of 15 cattle from the Tchad region gave 10 negative, 4 positive with titres of 640 mouse units, and 1 positive against 6,400 units. Two gorillas, 3 chimpanzees, 1 baboon, 1 Cercopithecus, 1 Cynosurus, and 2 porcupines gave negative results.

In conclusion the author points out that it is necessary to abandon the old view that the cycle of infection is man-Aëdes-man. It seems probable that there is some animal reservoir of the virus, and that infection may be transmitted by other insect vectors, although once established in man, *Aëdes aegypti* seems to be responsible for the development of the typical epidemics. *E. H.*

SOPER (Fred L.). **Yellow Fever : the Present Situation (October, 1938) with Special Reference to South America.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1938. Nov. 26. Vol. 32. No. 3. pp. 297–322. With 1 graph & 10 maps. [21 refs.] Discussion pp. 323–332.

A summary of our present knowledge of yellow fever, with special reference to the work of the Rockefeller Foundation in South America.

It is mentioned that, in 1915, a programme of eradicating yellow fever from the Americas was begun by collaborating in the organization of anti-*Aëdes aegypti* measures in the few remaining seed-beds of infection. This programme seemed to succeed in various countries but failed to eradicate yellow fever from Brazil, where two previously unrecognized epidemiological types, rural yellow fever transmitted by *Aëdes aegypti* and jungle yellow fever occurring in the absence of this mosquito, were found to be responsible for maintaining non-urban endemicity. The problem of rural *aegypti*-transmitted yellow fever has been solved by the extension of measures against this mosquito to the rural areas of north-east Brazil, the only region in South America where this type has been found.

Jungle yellow fever has also been found in Paraguay, Bolivia, Peru, and Colombia, and almost certainly occurs in Ecuador, Venezuela, Panama, British Guiana and Dutch Guiana. It has been observed in South Brazil as a wave-like phenomenon involving many of Brazil's richest districts in the years 1934–1938.

Control in Brazil is based on viscerotomy, anti-*aegypti* measures and yellow fever vaccination. As a result of viscerotomy over 140,000 liver tissues have been examined for yellow fever lesions since 1930, and more than 800,000 persons have been vaccinated during the first nine months of 1938 with satisfactory results and without serious complications of any kind [see JAMES above].

Finally the author stated that the threat of extension of yellow fever from present endemic regions of Africa to the ports of East Africa and to the Orient is sufficiently important to call for the application of these three methods to meet it.

In the discussion Dr. G. M. FINDLAY stated that the problems in Africa were essentially similar to those in South America. The endemic zone in Africa comprised an area of about 4,000,000 square miles extending up to the Abyssinian frontier. There was also evidence that in the Malakal region yellow fever had been present within the past five years, shown by the increase in the percentage of sera containing immune bodies. Whilst in both Africa and South America from 20–25 per cent. of wild monkeys in endemic areas contain yellow fever immune bodies, there is the striking difference that in South America some species are very susceptible to infection and show well marked clinical symptoms. In Africa the only species reacting in this manner is the Barbary ape, which, living north of the Sahara, is not exposed to infection. True jungle yellow fever has not yet been

found in Africa, but in many parts *Aëdes aegypti* occurs both domestically and non-domestically.

With reference to vaccination 5,700 Europeans have been immunized and no case of yellow fever has been known to occur amongst them, although between 35 and 40 cases of the disease have been recorded from non-immunized persons in the same districts. It is suggested that it might be possible to attempt immunization of the larger towns such as Lagos, Accra and Freetown, since these are potentially dangerous centres for the spread of infection.

The original article should be consulted for further points of interest discussed in this paper which do not lend themselves to abstraction.

E. H.

SCHÜFFNER (W.). **Yellow Fever—Some Remarks on Dr. Soper's Paper.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 587–594.

A discussion of the previous paper with special reference to statements in the article by SCHÜFFNER, WALCH-SORDRAGER and HOEKSTRA (see this *Bulletin*, 1939, Vol. 36, p. 25). The author agrees with the specificity of the mouse protection test but considers that it is preferable to use a 10 per cent. suspension of virus instead of 20 per cent. in order to detect very small quantities of immune bodies. [See also VAN DEN BERGHE below, p. 641.] *E. H.*

VAN DEN BERGHE (Louis). Recherche de l'immunité amarile dans les territoires sous mandat du Ruanda-Urundi. [**Studies on Yellow Fever Immunity in the Mandated Territories of Ruanda-Urundi.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 683–685.

The author mixed 50 sera collected from natives in the Ruanda-Urundi territory, especially in the east, and on the Uganda frontier. The individuals were all 20–30 years old, and their sera did not contain any yellow fever antibodies. Another 35 sera collected from other parts of the territory were also negative, with the exception of that of one individual who had lived outside the area. Accordingly, there is no evidence of the existence of yellow fever immunity in the Ruanda-Urundi.

This eastern limit of the disease in the Congo is difficult to explain, since it does not depend on the absence of Aëdes. With reference to the selection of Entebbe by the Rockefeller Commission as a site for the study of this problem, the author considers that it is too far east of the endemic area and it would be preferable to choose a site such as Wau in the Anglo-Egyptian Sudan or Kilo-Bambu in the Belgian Congo. *E. H.*

VAN DEN BERGHE (Louis). Substances de protection amarile dans le sérum d'un singe au Congo belge. [**Yellow Fever Anti-Bodies in the Serum of a Monkey from the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 91–95.

The author examined the sera of 11 monkeys including 5 chimpanzees, 4 baboons, a Cercocebus and a Colobus monkey, from the Belgian Congo. Eight of these monkeys came from regions where

yellow fever antibodies were found in the majority of young adults of the native population, but only one of the monkeys, a *Colobus polykomos*, gave a positive protection test. *E. H.*

Nicolau (Stéfan). Données sur la morphologie du virus de la fièvre jaune et sur la morphogenèse des inclusions qu'il provoque dans les tissus. [**Notes on the Morphology of Yellow Fever Virus and of the Inclusions that it provokes in the Tissues.**]—*C. R. Acad. Sci.* 1938. Oct. 24. Vol. 207. No. 17. pp. 750–752.

A study of sections stained by methyl blue and oxalate acid fuchsin, of the tissues of mice, guineapigs and monkeys dead of yellow fever leads the author to conclude that the virus is a small coccus. These agglutinate in the cells, and there degenerate, forming the characteristic inclusion bodies.

In mice the brain was often found to contain voluminous inclusions, without any internal structure, coloured a deep red, and occupying nearly all the nuclei of the cells of the choroid plexus, and similar appearances were noted in the glial cells. In certain nuclei, however, very small cocci were found, sometimes in chains of three to five individuals, whilst in other parts of the nuclei dense masses of them or fragments of chromatin were present. Similar appearances were observed in guineapigs and the neurones showed transition stages from masses of the cocci to intranuclear bodies. The hepatic cells of monkeys do not give as clear results as the brains of mice and guineapigs, but will be the subject of further study.

[These notes ignore the fact that the particles of yellow fever virus have been shown by filtration experiments to lie between 18 and 27 $\mu\mu$, which is approximately one-tenth the limit of resolution of the visual microscope.] *E. H.*

Findlay (G. M.) & MacCallum (F. O.). **Spontaneous Variation in the Neurotropic Strain of Yellow Fever Virus.**—*Brit. Jl. Experim. Path.* 1938. Dec. Vol. 19. No. 6. pp. 384–388. [12 refs.]

A record of the occurrence of spontaneous variation in a neurotropic strain of yellow fever virus, whereby it suddenly acquired viscerotropic properties.

A rhesus monkey was inoculated intracerebrally with a neurotropic strain of the virus that had been continuously passaged in mouse brains for five and a quarter years, involving some 750 consecutive passages, during which it regularly produced neurotropic symptoms whenever it had been tested in monkeys. On this occasion, however, the monkey died on the 5th day after inoculation without showing any nervous symptoms, but with the typical symptoms produced by the ordinary pantropic virus, such as liver necrosis, haemorrhages in the stomach, etc. Nevertheless the serum and liver of this monkey, injected intracerebrally into mice, produced encephalitis, not after an interval of 7–9 days, as is the case with the true pantropic strain, but after 4 to 5 days, the interval characteristic of the well-established neurotropic strain. After four further passages in mice this virus was inoculated into a rhesus monkey and again produced death without the development of nervous symptoms, but with the characteristics of the pantropic strain. On a third occasion, after five further passages in mice, similar results were obtained. The examination of frozen

and dried virus that had been preserved showed that after 670 consecutive mouse brain passages the virus still produced neurotropic symptoms in monkeys, therefore this variation occurred spontaneously between the 670 and 750 passages.

[It is hardly necessary to stress the extreme importance of these results, which emphasize the necessity of testing the pathogenicity from time to time of all strains of yellow fever virus used for human immunization.] *E. H.*

SCHÜFFNER (W.), SNIJDERS (E. P.) & WALCH-SORGDRAGER (B.). **The Effect of Continued Subinoculation of Yellow Fever Virus and its Longevity in a Preserved State.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 595–596.

The authors have maintained the Dakar strain of yellow fever virus since 1928 in its viscerotropic state alternately in *M. rhesus* and dried *in vacuo*. A substrain has also been kept by uninterrupted inoculations in mice and has now reached the 405th subinoculation. Both these strains have remained true to type and also are indistinguishable from a strain of the same origin that has been maintained for about 600 subinoculations in Professor Hudson's laboratory in New York.

Samples of neurotropic virus dried over phosphorus pentoxide and then kept in sealed tubes, from which the air was removed before sealing, have been found to retain their virulence completely unimpaired for *a period of no less than five years* ! *E. H.*

DA FONSECA (Flavio). Persistance de la vitalité du virus amaril inoculé dans les testicules du cobaye. [**The Persistence of Virulence of Yellow Fever Virus when inoculated into the Guineapig's Testes.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 34. pp. 1146–1148.

Six mice and an opposum *Didelphis aurita*, were inoculated intratesticularly with the Asibi strain of yellow fever virus and 12 days later their testes examined for the presence of virus, with negative results. A guineapig similarly inoculated showed the presence of virus in its testes after 14 days.

Neurotropic virus was found to persist in the testes of inoculated guineapigs in some cases up to 43 days, but in one case the virus had disappeared by the 30th day. *E. H.*

HÖRING (F. O.). **The Action of Urea on Yellow Fever Virus.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 597–599.

An account of experiments showing that yellow fever virus is inactivated by exposure to solutions of urea. Suspensions in serum saline (1 : 10) of mouse brains infected with the neurotropic strain, after filtration through Seitz K pads, were mixed with varying concentrations of urea, the mixtures kept at 37°C. for different periods and then inoculated intracerebrally into mice.

In one experiment 40 per cent. urea solution was mixed with falling dilutions of virus. With a dilution of 10^{-6}, inactivation was complete in 60 minutes. In addition, the period to death was prolonged at least 1 or 2 days in the case of mice injected with mixtures containing urea.

When the concentration of urea was reduced the time required to inactivate the virus increased considerably; with a 40 per cent.

solution and 10^{-2} virus dilution inactivation began after 30 minutes whilst with 20 per cent. it required 150 minutes to produce a similar result. The attenuated pantropic tissue culture virus was found to be much more easily inactivated, for with 40 per cent. urea, inactivation was perceptible immediately and was complete in 20 minutes.

The effect depends on the urea concentration, virus dilution and duration of contact. Although in human blood the amount of urea is not more than 30–40 mgm. per 100 cc. in febrile cases, its action cannot be entirely denied since it acts for longer periods on the virus.

The fact that urea inactivates yellow fever virus as it denatures proteins, suggests that this virus may be of a protein nature. *E. H.*

WHITMAN (Loring). **Failure of *Aëdes aegypti* to transmit Yellow Fever Cultured Virus (17D).**—*Amer. Jl. Trop. Med.* 1939. Jan. Vol. 19. No. 1. pp. 19–26.

A description of experiments to test directly the capacity of *Aëdes aegypti* to become infected when fed on volunteers vaccinated against yellow fever with vaccine virus 17D.

Of 8 patients fed on by mosquitoes on the 6th and 7th days after vaccination, 2 had minimal amounts of virus in their blood on the 7th day. None of the mosquitoes fed on these patients became infected.

Twelve lots of mosquitoes were fed on rhesus monkeys after vaccination, in the case of 5 lots of mosquitoes when the virus in the blood was as great or greater than in a series of human cases, but none of them became infected. Four attempts were made to infect *Aëdes* in the larval stage by immersing them in a strong suspension of vaccine virus. The adults emerging from the two most concentrated suspensions were found to contain virus, but were unable to transmit the infection by bite. None of the three monkeys infected by the suspensions of the ground up mosquitoes had any fever, nor was there any increase in circulating virus as a result of the single passage in the bodies of the mosquitoes.

It would seem, therefore, that there is very little, if any, danger of *Aëdes aegypti* transmitting the 17D virus. *E. H.*

PELTIER (M.), DURIEUX (C.), JONCHÈRE (H.) & ARQUIÉ (E.). La transmission par piqure de Stegomyia, du virus amaril neurotrope présent dans le sang des personnes récemment vaccinées, est-elle possible dans les régions ou ce moustique existe en abondance ? [**Is the Transmission of Neurotropic Yellow Fever Virus, in the Blood of Recently Vaccinated Persons, Possible by the Bite of *Stegomyia*, in Regions where this Mosquito is Abundant ?**]—*Rev. d'Immunologie.* Paris. 1939. Mar. Vol. 5. No. 2. pp. 172–195. With 12 charts.

A description of experiments in French West Africa to determine whether there was any possibility of Aëdes becoming infective after feeding on the blood of persons vaccinated against yellow fever.

The authors repeatedly fed mosquitoes on numerous vaccinated subjects, whose blood was shown to contain neurotropic yellow fever virus, and after intervals of from 2 to 23 days attempted to infect 8 rhesus monkeys by the bites of these mosquitoes, with uniformly negative results.

In a second series of experiments 2 rhesus monkeys were inoculated subcutaneously and another 2 intraperitoneally with the ground up contents of these mosquitoes. One of the monkeys inoculated intraperitoneally became infected but the other 3 remained well.

The results of these experiments confirm the view, also supported by five years' practical experience, that the use of neurotropic yellow fever virus for vaccination does not involve any risk of infection to the general population, even in regions where Aëdes is common. *E. H.*

FINDLAY (G. M.) & MACCALLUM (F. O.). **Epidemiology of Yellow Fever.** [Correspondence.]—*Nature.* 1939. Feb. 18. Vol. 143. No. 3616. p. 289.

The persistence of yellow fever infection in rural areas during dry seasons, when adult mosquitoes are either absent or present in very small numbers, suggests that other arthropods may possibly harbour the yellow fever virus, but hitherto none has been found to do so.

The authors record two recent observations suggesting that non-biting arthropods may be possible vectors. In the first place, it has been found possible to infect monkeys, *Macaca mulatta* and *Cercopithecus aethiops*, by introducing the yellow fever virus into the stomach by means of a soft catheter. The virus passed into the blood stream and, in the case of the Indian monkey, produced a fatal infection. Negative results were obtained in similar attempts to infect, by the alimentary tract, man, dog, rabbit, guineapig, rat, mouse, hen and pigeon.

Secondly, it was found that when yellow fever virus was injected into the abdomen of the cockroach (*Blattella germanica*), kept at 19°C., the virus retained its activity for at least 15 days. It is well known that monkeys, in addition to their vegetarian diet, feed on grubs and insects and, in view of the above observations, it would be of interest to determine exactly what animal foods are eaten under natural conditions by monkeys in the yellow fever areas of Africa and South America. *E. H.*

CALLOT (J.). Sur quelques gîtes et associations larvaires de moustiques. [**Breeding Places of Mosquito Larvae.**]—*Ann. Parasit. Humaine et Comparée.* 1939. Jan. 1. Vol. 17. No. 1. pp. 86–87.

Aëdes geniculatus has been found in the Department of Indre-et-Loire, in different parts of Alsace and in Seine-et-Oise. It breeds in rock holes in which the water contains rotting vegetable matter and resembles that found in tree holes. [*Aëdes geniculatus* has been shown to be an efficient vector of yellow fever, see this *Bulletin*, 1938, Vol. 35, p. 117.] *C. W.*

ROUBAUD (Emile), COLAS-BELCOUR (Jacques) & STEFANOPOULO (Georges-Jean). Le comportement du virus de la fièvre jaune chez le moustique *Aëdes geniculatus*. [**The Behaviour of Yellow Fever Virus in the Mosquito** *Aëdes geniculatus*.]—*C. R. Acad. Sci.* 1938. Dec. 12. Vol. 207. No. 24. pp. 1144–1146.

The authors previously showed that this species is capable of transmitting yellow fever by its bite [see this *Bulletin*, 1938, Vol. 35, p. 117], but in that experiment the mosquitoes were kept at 30°–35°C.

A second series of *Aëdes geniculatus* was fed on blood containing yellow fever virus and after five days at 30°C. kept at 20°–22°C. On the 18th and 22nd days respectively after this infective feed the mosquitoes were fed on a normal monkey, and produced neither infection nor immunity. The intracerebral inoculation into mice of the contents of five of these mosquitoes produced yellow fever encephalitis, showing that although these insects had not become infective by bite, the virus had survived within their bodies. *E. H.*

Bennett (Byron L.), Baker (Fred C.) & Sellards (Andrew Watson). **The Behaviour of the Virus of Yellow Fever in the Mosquito,** *Aëdes triseriatus.*—*Science.* 1938. Oct. 28. Vol. 88. No. 2287. pp. 410–411.

——, —— & ——. **The Susceptibility of the Mosquito** *Aëdes triseriatus* **to the Virus of Yellow Fever under Experimental Conditions.**—*Ann. Trop. Med. & Parasit.* 1939. Mar. 31. Vol. 33. No. 1. pp. 101–105.

Specimens of *Aëdes triseriatus* Say, a neoarctic mosquito ranging throughout the East of the United States, were fed on rhesus monkeys infected with yellow fever, and subsequently fed on normal monkeys.

In the first experiment with an incubation period of 17 days at 28°C., six of these mosquitoes were fed on a normal monkey which showed a slight febrile reaction six days later, then without any other symptoms being noticed, died of yellow fever 36 days after having been bitten.

In a second experiment four monkeys were bitten by mosquitoes that had fed on an infected animal 14 to 15 days previously. Two of these monkeys died of yellow fever after intervals of 10 and 13 days, during which they showed no signs of disease ; the other two monkeys showed no signs of infection, and did not develop immunity. In this experiment the mosquitoes producing infection had been kept for 14 to 15 days at 37°C., after ingesting the virus, whilst those monkeys which survived had been bitten by mosquitoes kept for the same period at 28°C.

Mosquitoes that had fed on infected monkeys were tested for the presence of virus after 13 to 16 days by grinding them up and inoculating the suspensions into the brains of white mice. Virus was recovered from 6 out of 10 mosquitoes.

These experiments show that *Aëdes triseriatus* is an efficient carrier of yellow fever, but there is some evidence of attenuation of the virus in this mosquito. *E. H.*

Dominguez (F.). Trois points importants dans l'histoire de la découverte de la transmission de la fièvre jaune par le moustique. [**Three Important Points in the History of the Discovery of the Transmission of Yellow Fever by the Mosquito.**]—*Bull. Acad. Méd.* 1938. Nov. 15. 102nd Year. 3rd Ser. Vol. 120. No. 33. pp. 303–307.

Shannon (Raymond C.). **Methods for collecting and feeding Mosquitoes in Jungle Yellow Fever Studies.**—*Amer. Jl. Trop. Med.* 1939. Mar. Vol. 19. No. 2. pp. 131–140. With 4 figs. on 2 plates.

A description of the methods used for capturing, transporting, classifying and feeding the mosquitoes used in experiments to determine whether or not yellow fever infection could be produced in laboratory

animals by the bite of jungle mosquitoes within 24 hours after their capture.

A horse was used as bait for the capture of day-flying sylvan mosquitoes and details are given of the muslin cloth and mosquito net trap in which it was enclosed. The denser and more humid parts of the jungle were found to be the most favourable sites.

The original paper should be consulted for details of the transportation and feeding of the mosquitoes.

Usually one-half or more of Mansonia and Aëdini fed, whilst only about one-quarter of Sabethine mosquitoes would take blood.

It was found that a staff of eight persons could tube, classify and feed between 2,000 and 3,000 mosquitoes per day. *E. H.*

CARNAHAN (Charles T.). **A Two-Year Record of Adult Mosquito Trapping in Dade County, Florida.**—*Public Health Rep.* 1939. Apr. 14. Vol. 54. No. 15. pp. 608–611.

Adult mosquitoes which visit light have been trapped at Miami, Florida, without intermission for two years.

The author used six New Jersey traps: these consist essentially of an electric light visible from all sides, together with a fan which sweeps down the insects which come towards the light and delivers them into a cyanide bottle. The results of two years' work are shown in a table which gives monthly totals for all traps together, the species of mosquito being shown separately. Twenty-three species were captured, all of them known previously to occur in the locality.

In two years the traps took nearly a quarter of a million mosquitoes. About 38 per cent. belonged to the species of Aëdes which bred in salt marshes and which were most abundant in summer. 5·9 per cent. were Anopheles of four species, of which *crucians* was commonest: these insects were commoner in the colder months. Over 40 per cent. of the total catch was made up of various mosquitoes which do not bite man. The monthly totals ranged from below 400 to about 55,000. There was a striking reduction of mosquitoes in the second year which the author attributes to a period of dry weather. *P. A. Buxton.*

WELCH (E. V.). **Insects found on Aircraft at Miami, Fla., in 1938.**—*Public Health Rep.* 1939. Apr. 7. Vol. 54. No. 14. pp. 561–566. [Summary appears also in *Bulletin of Hygiene.*]

This is an interesting summary, with a series of tables, showing the orders, genera and species of insects found, alive or dead, on aircraft arriving during 1938 at Miami from Central and South America and Mexico.

In brief, of 398 aircraft inspected 187 (47 per cent.) harboured insects; these totalled 651 and 166 of them were alive. Forty dead and five live mosquitoes were found, among them *Culex quinquefasciatus* (6 dead, 3 alive), *Mansonia indubitans* (18 dead, 1 alive) and 1 dead *Anopheles albimanus*; no *Aëdes aegypti* were found. The most prevalent insect was the house-fly. *H. H. S.*

STEVENSON (Lewis D.). **Pathologic Changes in the Nervous System in Yellow Fever.**—*Arch. Pathology.* 1939. Feb. Vol. 27. No. 2. pp. 249–266. With 9 figs.

A study of the whole brain from 20 cases of persons who died of yellow fever and of pieces of brain tissue from 14 additional cases.

A detailed examination of the brains of these 20 cases, in 3 cases including the spinal cord, is reported, from which it is shown that the chief lesion was perivascular haemorrhage. These haemorrhages were most frequent in the subthalamic and periventricular region at the level of the mamillary bodies. The temporal pole was next most involved and the cerebellum only slightly less so.

Perivascular lymphocytic exudate was noted in 9 cases but, with the exception of a single case, this was slight. Changes in the nerve cells were insignificant and no inclusion bodies were seen. Reactive changes in the microglia and astrocytes were slight.

The author concludes that in this series there was no definite evidence of neurotropism on the part of the yellow fever virus.

E. H.

MONTENEGRO (João). A cellula de Councilman-Rocha Lima. [**The Councilman-Rocha-Lima Cell.**]—*Brasil-Medico.* 1938. July 16. Vol. 52. No. 29. pp. 652–654. English summary.

The author defines once again what is to be understood as the typical Councilman-Rocha-Lima cell in the yellow fever liver. In tissue stained by haematoxylin and eosin it shows coagulative necrosis, less angular and more rounded than the non-necrosed cell, with a well-marked edge and surrounded by a narrow clear halo; the cytoplasm is eosinophilic, non-granular, more refractile than normal and contains small vacuoles; the nucleus is smaller and more rounded than that of the normal cell, usually about the centre, is homogeneous [*i.e.* shows no nucleolus] and stains a deeper red than does the cytoplasm. Rarely the cell is binucleate.

He then describes other cells which may be seen bearing greater or less resemblance to this and points out the differences. He thus makes two large divisions, typical and atypical, and sub-divides the latter into "identifiable atypical" and "suspect atypical" according to the degrees in which they deviate from the typical in respect of the size, shape and staining of the nucleus, the presence of vacuoles in the cytoplasm and its granularity, and its size, shape and staining properties.

H. H. S.

VAN DEN BERGHE (Louis). Modifications techniques du test intrapéritonéal de protection amarile chez la souris. [**Technical Modifications of the Intraperitoneal Yellow Fever Protection Test in Mice.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 81–86. With 1 plate.

The author recommends some modifications of Sawyer and Lloyd's technique (see this *Bulletin*, 1932, Vol. 29, p. 198) for the application of the intraperitoneal mouse protection test for yellow fever.

The serum to be examined is diluted 1 : 7 and the virus suspension is increased to 20 per cent. instead of the usual 10 per cent. [But this increase in strength was recommended by SAWYER himself in 1934. See this *Bulletin*, 1934, Vol. 31, p. 837.] As a result of the small quantity of serum used it is usually possible to repeat the test when doubtful reactions are obtained.

The brains of infected mice are put in a sterile bottle containing glass beads and shaken until broken up, when peptone water is added sufficient to make a 20 per cent. suspension. Then 0·5 cc. of the serum

to be examined is drawn up into a 5 cc. syringe followed by 3 cc. of the virus suspension in the bottle. When all the syringes have been used, one for each lot of serum to be examined, the mice are then injected in batches of 6, using 0·5 cc. for each mouse. The remaining 0·5 cc. in each syringe is kept in reserve for about half an hour in case it is necessary to inoculate another mouse. For controls the author considers it indispensable to set up two series, one in which the virus is mixed with normal rabbit serum, and the other with a mixture of virus and immune rabbit serum. In these controls with normal serum, 4 or more out of 6 should die of the infection and with immune serum not more than one. [See also SCHÜFFNER, above, p. 634.]

E. H.

VAN DEN BERGHE (Louis). Considérations générales sur le diagnostic de certitude de la fièvre jaune à propos d'un cas cliniquement suspect au Congo Belge. [**General Considerations on the Certainty of Diagnosis of Yellow Fever with Special Reference to a Suspected Clinical Case in the Belgian Congo.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 671–682. [11 refs.]

The description of a fatal case of acute fever, with jaundice, blood in the stomach, and a pale liver with centres of sclerosis. The possibility of this being a case of yellow fever was investigated, but the examination of liver tissue was negative and also there were no further cases of infection in the neighbourhood.

The author then gives a general discussion of the methods employed for the diagnosis of yellow fever, including anatomopathological examination, serological tests and the isolation of the virus, with special reference to their application in the Belgian Congo.

E. H.

JADIN (Jean) & ARNALDI (Enrico). Une épidémie d'une affection ictérigène à Zongo. Possibilité d'une infection amarile atypique. [**An Epidemic of a Disease showing Jaundice at Zongo. The Possibility of Atypical Yellow Fever.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 435–473. With 13 charts, 1 plan & 1 map.

A detailed description of an epidemic which occurred during 1938 at Zongo, a small frontier post of the Belgian Congo near Bangui, where yellow fever is known to occur.

The clinical symptoms of 17 patients observed included pale and late jaundice, early albuminuria which rapidly increased, and occasionally clots of blood in the stomach. The absence of any parasites in the blood or urine supported the view that it was a virus infection, but the authors consider that the symptoms were not sufficiently definite in themselves to justify a diagnosis of yellow fever. There were 10 deaths out of 20 cases, three of which were not seen. The results of the pathological examination of the livers of 4 cases (by Bablet) did not agree with the clinical symptoms, and all were negative as far as histological changes characteristic of yellow fever were concerned.

The results of mouse protection tests showed that the serum of only 1 patient gave a definitely positive reaction, but 3 or 4 gave feebly positive results.

The authors discuss the epidemiology of the disease and mention that 10 other patients were in contact with these cases, but kept under mosquito nets, and none of them became infected. Moreover, the application of anti-mosquito measures and anti-yellow fever vaccination was followed by the disappearance of the epidemic. Accordingly, they are of the opinion that it might be considered as an outbreak of atypical yellow fever. *E. H.*

Ross (G. A. Park). La destruction automatique des moustiques dans les aéronefs et le vecteur de la fièvre jaune dans les traversées aériennes en Afrique. [**Automatic Destruction of Mosquitoes in Aircraft and the Yellow Fever Vector in African Air Travel.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Sept. Vol. 30. No. 9. pp. 2002–2031. With 3 figs. [Summary appears also in *Bulletin of Hygiene.*]

In this comprehensive paper Dr. Park Ross expresses his views on some of the problems which the advent of air travel in Africa has produced.

Naturally, the possibility of the transmission of yellow fever to susceptible, but hitherto uninfected, areas raises problems for the health authorities which are new and not easily solved.

The author points out that whereas regular commercial air line services are comparatively easy to control, private flights, and planes chartered for passages not on the regular air routes, are not so readily brought within the scope of the medical authorities.

The present imperfect state of our knowledge of the distribution of yellow fever in Africa is considered, and the opinion expressed that insufficient sampling of populations by the mouse protection test has as yet been undertaken. Consequently certain areas have been proclaimed "suspect" by the Government of the Union of South Africa, these areas being "those territories West of Longitude 35 East and North of Latitude 13 South, and comprising any part of the Belgian Congo or Angola not included in the above."

Dr. Park Ross considers that, unlike the problem in the Southern States of the U.S.A., the history of an air passenger from African territories is easy to ascertain, thus obviating the same risk in the unwitting conveyance of a human vector and reducing the health problem to one concerned almost entirely with the insect vector.

Conditions on the East Coast, both in urban and rural areas, cause the South African Authorities considerable apprehension owing to the prolific breeding of Aëdes and the heavy dhow traffic. Dhows are apparently notorious in their infestation with mosquitoes.

The difficulty of effective Aëdes control in towns as well as in rural areas appears to be a problem baffling alike to authorities in the Southern U.S.A. and in Africa.

It is this factor more than any other that has led to the experiments in the disinsectization of aircraft as a safeguard against the spread of yellow fever.

Measures taken at African aerodromes are in Dr. Park Ross's view apt to be nullified for such reasons as an insufficiency of recognized airports under control to avoid forced landings, the impossibility of ridding some aerodromes of breeding grounds (*e.g.*, the Nile and Great Lakes), mosquito harbourage within insect flight range of the aerodromes but not under the control of the local authority, and last

but not least the reluctance of some health authorities to inconvenience the air lines by disinsectization of aircraft immediately on arrival and before landing passengers, cargo and mails.

Some idea of the prevalence of insects in aeroplanes can be gained from the results quoted of the inspection of 84 seaplanes arriving at Durban. In 40 no insects, in 28 living insects, and in 16 dead insects, were found. Of these insects, culicines were found in five instances and anophelines and Aëdes twice each.

Of the 84 planes quoted, 44 had received recent treatment with " Flit " either *en route* or at the last port of call by the Airway's staff. It is to be noted that only 11 out of 40 planes arriving unsprayed brought in living insects.

An interesting description is given of the procedures taken at Durban on the arrival of aircraft. At present Durban is the southern terminus of the seaplane route of Imperial Airways.

The aircraft moor 300 yards from the shore and are required to keep hatches and doors closed. The Health Officer goes aboard and puts up an insecticide mist over one exit through which the passengers pass into a launch for conveyance to a quarantine pontoon. On the pontoon medical and immigration control is exercised, the pontoon being fitted with the requisite examination rooms, etc. A medical card is filled in giving the usual details, much as is done in the ordinary way with ships.

In the meantime a European Health Staff, using high-pressure sprays, disinsectizes the plane, a proceeding occupying about 20 minutes. After disinsectization is completed baggage and mails may be handled.

Suspect passengers can be detained on the pontoon, accommodation being provided for the purpose, and, the pontoon being moored off shore, complete isolation can be maintained.

It is pointed out that the formalities connected with disinsectization on arrival at an airport represent a certain loss in flying time and to obviate this disinsectization in the air or just on landing has been tried.

Part II of the paper deals with Automatic Disinsectization. In essential this comprises a plant for disinfection carried in the plane with fixed ducts leading to all compartments, both for the dissemination and the removal by extraction of gases lethal to mosquitoes.

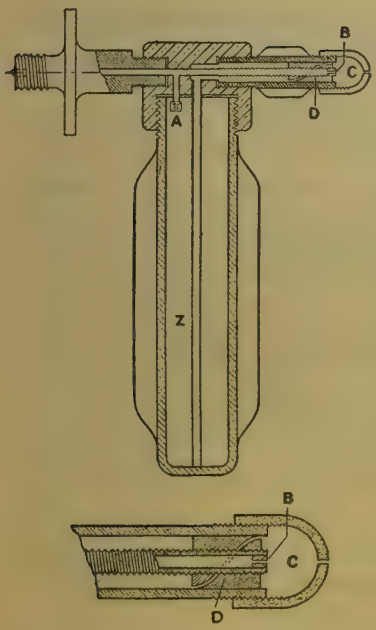
There are, however, certain primary difficulties to be overcome, particularly the weight of the apparatus, constructional problems and the difficulty of obtaining a really effective gaseous disinfectant. Atomized disinfectants are unsuitable for conveyance by lengthy ducts and the only reliable gas, HCN, too dangerous for routine use even in dilutions suitable for killing mosquitoes.

The advent of a new type of seaplane, built in effectively bulkheaded compartments, partly solved one of these problems, for it was found possible to fumigate section by section while in flight.

Objections to power drive for the apparatus were overcome to some extent by the use of CO_2 as a propellent. The use of " sparklet " bulbs in this connexion is described, and the advantage of knowing that a standard charge, such as a " sparklet " will propel a standard amount of disinfecting solution into the space to be dealt with has obvious advantages.

It has been found to be quicker in action than aspiration types of apparatus.

Self-explanatory drawings of a " Larmuth " unit are given, and it was found that a unit of this type for each compartment in a plane



Larmuth's Spray Ejector, new type. (Reproduced half-size).

A syphon sparklet bulb containing CO_2 under pressure in excess of 400 lbs. per square inch provides the motive power. The measured dose (60 cc.) of insecticide is placed in container Z. High pressure CO_2 enters Z through jet A and mixing chamber C through the "booster" jet B. Block D has two diagonal grooves cut in it to admit the insecticide forced up from container Z into chamber C. On reaching chamber C atomization occurs and is enhanced by the CO_2 under pressure escaping from jet B. [Positions of B and C are adjustable and all nozzles are easily accessible for cleaning.]

[Reproduced from *Bulletin de l'Office International d'Hygiène Publique*].

(weight 1 lb. each unit) was less in total than a large central installation with ducts to each compartment.

An ingenious type of machine, the "Phantomyst" is also described, but for efficiency electric motor power is required and the weight is excessive.

Certain desiderata for insecticides must be insisted upon. These are:—

(1) Non-inflammability.
(2) Non-clogging in the apparatus.
(3) Quick killing in action.
(4) Non-toxic to human beings.
(5) Non-staining.
(6) Odourless within reason.

At present most insecticides have a concentrated pyrethrum extract base diluted with paraffin, carbon tetrachloride, or water. Large bulk should be avoided from considerations of weight and stowage.

Consideration is given at length to the fulfilment of the above postulates by these diluents with carbon tetrachloride coming first in order of merit.

Extensive tests in the flying boat "Cassiopia" and others using Larmuth's Spray, old type and new type, and "Phantomyst" plant were made with the plane at rest.

The solutions used were "Deskito" and "Pyagra," and results are given in detail. It appears that complete disinsectization can be carried out in from 5–10 minutes.

In his summary and conclusions, Dr. Park Ross finds:—

(1) That under present conditions there is a risk of spread of yellow fever by aircraft in Africa.

(2) Conveyance by aircraft of living mosquitoes from one African territory to another should be prohibited by law.

(3) Effective disinsectization of aircraft is essential and should be capable of being done by unskilled hands; the health authorities acting in a supervisory capacity only as in seaports.

(4) Experience shows that of the trio—human factor, insecticide and apparatus—the human factor is the least reliable and should be eliminated as far as possible.

(5) Automatic plant is aimed at eliminating the human factor and allowing disinsectization by aircraft crews when in flight or on the ground.

(6) The essence of air travel is speed, and delay should be minimized as far as possible in carrying out health measures.

(7) Disinsectization in flight prevents delay to disembarkation of passengers and freight on arrival.

(8) Of insecticides tested, Aircraft Pyagra and Water Soluble Deskito were equally non-inflammable; the former was quicker in action, more reliable and gave 100 per cent. kill in every case. Deskito was practically odourless.

(9) Automatic propulsion of measured doses of insecticide, as in Larmuth's ejector, proved superior to aspiration types such as the "Phantomyst."

(10) Experiments in the flying boat "Cassiopia" showed that disinsectization can be effectively carried out in from 5–10 minutes.

M. T. Morgan.

Public Health Reports. 1938. Sept. 9. Vol. 53. No. 36. pp. 1621–1622.—**Miami Health Officer acts to prevent the Introduction of Yellow Fever.**

Owing to the fact that the flight time of airplanes coming to Miami, Florida, from actual or potential foci of yellow fever in South America, is now only ten hours, the local health officer has issued a special order regarding passengers. Any person coming to and remaining in Miami, who, within six days previously has been in any district which the United States Public Health Service has declared an actual or potential focus of yellow fever, must within 24 hours report in person to the Department of Public Health and be kept under surveillance until six days have elapsed. Should visitors stop temporarily in Miami and then proceed to some destination in the *Aëdes aegypti* area of the United States, the Miami authorities will notify the proper health authorities to keep such persons under surveillance until the six days have elapsed. *E. H.*

Hargett (M. V.). Surveillance des passagers des Aéronefs au point de vue de la fièvre jaune. [**The Inspection of Aircraft Passengers with Reference to Yellow Fever.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Sept. Vol. 30. No. 9. pp. 1981–1986.

Details of the methods recommended by the Pan-American Sanitary Bureau, including the necessity for each passenger, except those vaccinated against yellow fever or otherwise immune, being provided with a Certificate of Origin, when travelling in aircraft from regions either infected or suspected of being infected with yellow fever. Persons coming from such districts must present this certificate, together with their passport, and may be required to be kept under surveillance by the sanitary authorities for a period of six days.

E. H.

Cumming (Hugh S.). Rapport sur les refuges pour moustiques dans les aéronefs. [**Report on Mosquito Harbourages in Aircraft.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Sept. Vol. 30. No. 9. 1998–2001. With 6 figs. on 2 plates. [Summary appears also in *Bulletin of Hygiene.*]

The authors of this note communicated to the International Health Office, Paris, by Surgeon General Cumming, formerly Surgeon General of the United States Public Health Service, describe every point in five types of aircraft employed by the Pan-American Airways which might conceivably form a harbourage for mosquitoes. First, in the interior of the aircraft there are ten main harbourages : (1) Running the length of each compartment under the floor is the hold divided in three parts by longitudinal bulkheads. The floor is not lifted for disinsectization, although there are holes in it which would permit the entry of mosquitoes into the " bilges." (2) In the toilet compartment, there are built-in cupboards and spaces around the washbasin and toilet pedestal. Disinsectizants would not penetrate into these spaces except by direct application. (3) Window curtains, drawers under the seats, lifebuoys, and pockets in the seats make excellent mosquito harbourages. (4) The space between the ceiling and the pilot's cabin, filled with packing as isolation against sound, is in relation with the ventilation. The wire mesh partitions are insufficient to prevent the entry of mosquitoes. (5) The purser's office, sanitary bucket, postal compartment, crew's lockers, and the battery space are fairly open and can be disinsectized. (6) The ventilation system comprises openings on the leading edge of the wing, conduits running the length of the aircraft with various occasional openings in the cabin and in each compartment. The screening of this system is insufficient, consisting of a lattice intended merely to prevent the entry of birds. (7) In the centre of the roof of each compartment is a longitudinal space opening into the cabin. This space is intended for protection against noise but is not freely accessible and might afford harbourage. (8) Above the roof on each side of the cabin are spaces used for cables running to the tail of the aircraft. (9) Forward of the pilot's cabin there is a space used for ballast. In some cases this space communicates with the cabin but is difficult to disinsectize. (10) Spaces between the bulkheads separating the compartments offer possible refuges where disinsectizing vapour would not easily penetrate.

With regard to the exterior surface of the aircraft ; modern types are effectively aerodynamic and offer but little harbourage to mosquitoes. Nevertheless, there are certain points which might do so : (1) Wings, ailerons, stabilizers, rudders for direction and altitude are hollow and communicate with the interior by openings of about an inch in diameter, the object of which is to equalise atmospheric pressure in the interior and exterior of the craft. (2) The interior is connected with the wings through the " tower," through which all the cables lead, going from the pilot's cabin to the wing structures and round these cables are openings giving direct communication with the cabin and the wings. (3) The fins in the tail of the craft serve to support the caudal structure and the transmission of cables to the tail. (4) The struts which consolidate the wing structures and tails are aerodynamic by means of hoods that might offer refuge to mosquitoes. (5) The petrol tanks are in the wings. On the wings are filters which

are sunk, leaving between them and the adjacent part of the wing important hollows by which mosquitoes might enter.

There are a number of other points of the same nature cited in the report, to which reference should be made, which might conceivably harbour mosquitoes. Thus the report shows that there are an astonishing number of spaces, hollows, or crevices which by inadvertence might in theory harbour mosquitoes, but it is highly doubtful whether many of the points cited in the report would do so in practice. More likely ones seem to be closed or semi-closed spaces in the interior of the hull and wings.

The report is accompanied by photographs indicating some of the points to which reference is made. *M. T. Morgan.*

Robineau. Instruction récapitulative sur la prophylaxie anti-amarile au Sénégal. [**Recapitulatory Information concerning Yellow Fever Prophylaxis in Senegal.**]—*Ann. de Méd. et de Pharm. Colon.* 1938. Oct.–Nov.–Dec. Vol. 36. No. 4. pp. 914–945. With 2 figs.

A summary of the various measures that have been put into operation in connexion with anti-yellow fever prophylaxis in Senegal, including useful administrative details such as lists of the officials responsible for their application in different branches of the service. The article should be consulted in the original by those interested in practical details of this subject in Senegal. *E. H.*

Bulletin de l'Office International d'Hygiène Publique. 1938. Nov. Vol. 30. No. 11. p. 2549.—Rapport de la commission de la fièvre jaune. [**Report of the Yellow Fever Commission.**]

The Commission agrees with the orders for the amelioration of the quarantine conditions for yellow fever in the case of vaccinated persons, issued on September 14th, 1938, by the Governor-General of French West Africa.

With regard to the duration of immunity after yellow fever vaccination, it is considered that it is too soon to give a definite opinion.

Finally it is stated that, from a practical point of view, the results of protection tests in domestic animals do not in any way affect the specificity of these tests in man. *E. H.*

Smith (H. H.), Penna (H. A.) & Paoliello (A.). **Yellow Fever Vaccination with Cultured Virus (17D) without Immune Serum.**—*Amer. Jl. Trop. Med.* 1938. Sept. Vol. 18. No. 5. pp. 437–468. With 1 chart & 4 figs. [15 refs.]

A detailed account of a year's experience in the production and application of a cultured yellow fever vaccine virus (17D), during which time more than 59,000 persons in Brazil were inoculated, with very satisfactory results.

The strain of virus came originally from the Asibi strain, which was established in tissue culture containing mouse embryonic tissue, and subsequently in media containing whole fowl embryo. After 58 subcultures in this medium it was then subcultured in one containing

fowl embryo, from which the brain and spinal cord had been removed, and in this has been maintained for more than 200 passages. Since the titre of virus in these cultures is low, the vaccine for human use was prepared from developing fowl embryos inoculated with this culture virus. Eggs with living embryos, after about seven days' incubation, are inoculated above the embryo with 0·06 cc. of the culture material and then incubated for three or four days before being taken out for the preparation of vaccine.

The pooled embryos are ground up, usually in normal human serum, then centrifuged at 3,000 r.p.m. for thirty minutes, after which the supernatant fluid, containing the virus, is cleared through a Buchner funnel with a thin film of asbestos fibre, and subsequently passed through Seitz E.K. filter discs at 10 lb. pressure. This filtrate is put up in ampoules containing 3·0 cc. or in 1·0 cc. tubes. It is then frozen in alcohol-carbon-dioxide-snow, and desiccated *in vacuo* over sulphuric acid. Each batch is then tested for sterility, and also tested for any enhanced or viscerotropic properties, or neurotropism, by intracerebral inoculation into a rhesus monkey and the quantity of virus in the vaccine determined by tests in mice. Finally the vaccine is stored at 4°C. and always sent to the field packed in ice in thermos containers.

Vaccination consists of the subcutaneous inoculation of the rehydrated vaccine, 0·5 cc. being the usual dose, though occasionally 1·0 cc. was used in the laboratory. The quantity of virus, measured in M.L.D. for mouse units, varied from 500 up to 11,000.

Small groups were studied to test the presence of circulating virus and the production of antibodies. Out of 29 men, virus was found in the blood of 3 on the fourth day, 3 on the fifth, 3 on the sixth, 2 on the seventh and 1 on the tenth day. It is of interest that 8 out of 12 patients who received more than 5,000 M.L.D. of virus, showed circulating virus, as compared with 3 out of 15 who received less than this dose.

Protective antibodies were demonstrated during the first 28 days in the blood of all 29 patients vaccinated. None of 24 tested after 7 days was immune, and 9 out of 23 had not developed antibodies after 14 days. As a general rule the titres were low in comparison with those developed by rhesus monkeys, or by humans after recovery from clinical yellow fever.

The minimal infective dose of virus necessary for successful vaccination was found to lie between 14 and 140 M.L.D. for mice, 7 out of 10 men receiving only 14 M.L.D. developing satisfactory immunity. The results of studies on more than 1,800 vaccinated persons indicate that approximately 95 per cent. of those vaccinated under field conditions acquire immunity. Mouse protection tests on 9 men taken six to seven months and 21 men taken a year after vaccination, showed that protective antibodies were still present. One patient, however, showed the disappearance of immunity after one year and others a lowered titre, indicating a diminution in the quantity of antibodies.

Any reactions to the vaccine were always mild, generally consisting of headache, low-grade fever, and influenza-like pains. These symptoms as a rule came between the third and eighth days, being most common on the sixth or seventh days, and very rarely were severe enough to stop work. No instances of delayed reaction to vaccination have been observed. *E. H.*

PELTIER. L'atténuation des mesures quarantenaires antiamariles en faveur des vaccinés ayant un test de protection fortement positif. [**The Amelioration of Quarantine Conditions for Yellow Fever in the Case of Vaccinated Persons giving a Strongly Positive Protection Test.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Nov. Vol. 30. No. 11. pp. 2542–2548.

The regulations in French West Africa concerning the quarantine measures for the control of yellow fever have recently been modified in the case of those giving positive protection tests.

The author gives the results of observations on the results of various serological tests at Dakar during the past four years. With regard to the specificity of the mouse protection test for the examination of human sera, it is pointed out that out of 117 specimens from natives born previously to the Dakar yellow fever epidemic in 1927, 71 gave a positive test, whilst 100 sera of children born since 1930 were all negative. The results of yellow fever vaccination by Laigret's method of three inoculations of a phosphatic suspension of mouse virus, and the later method of using egg-coated virus are summarized in the following table, which indicates the duration of immunity based on protection tests :—

Phosphate vaccine.

Period after vaccination.	*Result of mouse test.*	
Less than 1 year	Strongly positive	69
	Feebly+ or negative	6
1–2 years	Strongly+	30
	Feebly+ or negative	10
2–3 years	Strongly+	22
	Feebly+ or negative	6
3–4 years	Strongly+	25
	Feebly+ or negative	6

Egg vaccine.

Less than 1 year	Strongly positive	216
	Feebly+ or negative	32
1–2 years	Strongly+	34
	Feebly+ or negative	10
More than 2 years	Strongly+	7
	Feebly+ or negative	2

It would seem, therefore, that vaccination gives strong protection in at least 95 per cent. of the cases, but that it may be advisable to repeat the vaccination every two years. *E. H.*

DONOVAN (Anthony). Organisation de la vaccination antiamarile dans le personnel des compagnies de navigation aérienne et parmi les officiers du service de l'hygiène publique des États-Unis. [**The Organization of Anti-Yellow Fever Vaccination in the Personnel of the Aerial Navigation Companies and among Officers of the United States Public Health Service.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Sept. Vol. 30. No. 9. pp. 1987–1994.

An account of the methods adopted by the United States Air Force personnel for vaccination against yellow fever. Details are given of the methods of obtaining and transporting the vaccine, and also inoculation technique. The results of 601 vaccinations, using a

vaccine prepared at the Rockefeller Institute, consisting of virus attenuated by prolonged cultivation in media containing fowl embryo tissue [see this *Bulletin*, 1937, Vol. 34, p. 690], indicate that 61 per cent. of the subjects had no appreciable reaction, but 148 showed a rise in temperature, accompanied by headache, lumbar pains, or various complex symptoms. This reaction generally occurred six to eight days after vaccination and only in very exceptional cases lasted for more than 24 hours.

The question of the future supply of the vaccine is raised by the author, for it is unlikely that the Rockefeller Foundation will be able to continue its manufacture on a large scale. It is suggested that the National Institute of Hygiene would be the most suitable organization for this purpose. *E. H.*

Donovan (Anthony). L'immunisation du personnel des lignes aériennes contre la fièvre jaune. [**The Immunization of the Personnel of Air Lines against Yellow Fever.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Sept. Vol. 30. No. 9. pp. 1995–1997.

A total of 938 vaccinations against yellow fever are recorded up to 1st April, 1938, among the personnel of the Pan-American Airways. No serious reaction has ever been observed, and only about one in twenty showed any reaction, generally about the sixth or seventh day, and this only lasted for about 24 hours. However, by taking daily temperatures it was found that about a third of the subjects showed a slight rise of temperature, but in the great majority of cases without being accompanied by any subjective symptoms. *E. H.*

Findlay (G. M.), MacCallum (F. O.) & Murgatroyd (F.). **Observations bearing on the Aetiology of Infective Hepatitis (So-called Epidemic Catarrhal Jaundice).**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 575–586. [57 refs.]

A valuable summary of recent observations, with a critical discussion, bringing forward evidence in support of the view that infective hepatitis in man is a virus infection.

Under the name of catarrhal jaundice at least three conditions have been described, one of which is characterized by necrotic changes in the liver and is best termed infective hepatitis. This disease cannot be transmitted with any certainty to experimental animals. The aetiological agent does not seem to be a bacterium, spirochaete or protozoon, but may well be a virus, since the incubation is long, 35 days to 7½ months, and the disease is characterized by a leucopenia, affecting especially the polymorphonuclear leucocytes. In addition, it is freely filterable through Seitz EK filters, and is not visible under ordinary powers of the microscope.

The infection of a pool of measles immune serum in children resulted in the development of cases of hepatitis, and the livers of fatal cases showed necrotic changes. In addition children who came in contact with these patients also developed jaundice indistinguishable from infective hepatitis.

The injection of an attenuated strain of yellow fever virus grown in a medium containing human serum, resulted in 95 cases of hepatitis. The symptoms were similar to those of infective hepatitis and one who

died of pneumonia 12 weeks after inoculation showed hepatitis. The occurrence of jaundice following yellow fever immunization has been traced to the introduction of a filterable hepatotoxic agent in the culture medium, presumably from apparently normal human serum.

It is probable, therefore, that the condition referred to as post-inoculation jaundice is identical with ordinary infective hepatitis, and that the causal agent is a filterable virus. Consequently pools of apparently normal human serum should not be used for human inoculation unless the medical history of all donors can be followed for a considerable period of time, and at least one month. [See also JAMES, above, p. 631, and this *Bulletin*, 1939, Vol. 36, p. 30.] *E. H.*

DA FONSECA (Flavio) & ARTIGAS (Paulo). Recherches sur la sensibilité d'animaux sauvages au virus amaril. [**Investigations on the Susceptibility of Wild Animals to Yellow Fever Virus.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 34. pp. 1134–1137. [14 refs.]

At the parasitological laboratory of the Butantan Institute the authors have tested the susceptibility to yellow fever of various Brazilian wild mammals, in order to determine whether any species, other than Primates, might harbour the infection. However, yellow fever virus was never found in the blood of any of the numerous wild animals tested by intracerebral inoculations into mice.

The peccary, *Tajassu tajassu*, is very susceptible to the intracerebral inoculation of neurotropic virus, and in this species it can be passaged in series, by using brain material. The blood was negative from the third day and the subcutaneous inoculation of a young peccary gave negative results.

A wild guineapig, *Cavia aperea* (*rufescens*?), is susceptible to intracerebral inoculation after passage and the virus shows alteration in virulence towards mice.

The capybara, *Hydrochoerus capybara*, is very susceptible to intracerebral inoculation, showing the usual symptoms of paralysis. The virus was not present in the blood after the third day and intraperitoneal inoculations of the virus gave negative results.

The opossums, Didelphyidae, seem to be very little susceptible to infection. In one case virus was recovered from the brain of an animal inoculated intracerebrally 8 days previously and in another case from one inoculated subcutaneously 9 days before, but the virus was not recovered from the blood of 14 animals inoculated.

The coati-mundi, *Nasua narica*, succumbs to intracerebral but not to subcutaneous inoculation.

Tahira barbara seems to be susceptible to intracerebral inoculation since it showed paralytic symptoms five days later, but its organs are toxic to mice and therefore the presence of virus could not be demonstrated.

One species of armadillo, *Cabassous unicinctus*, contained virus in its blood 5 days after subcutaneous inoculation of the Asibi strain, but showed no other signs of infection. Another species, *Dasypus novemcinctus*, showed paralysis after intracerebral inoculation, but the virus was not recovered. Other individuals inoculated in various ways with the Asibi strain showed no signs of infection.

The subcutaneous inoculation of the Asibi strain gave negative results with the following animals:—*Coenda prehensilis*, *Nectomys*

squamipes, Sciurus aestuans, Hydrochoerus capybara, Cerdocyon thous azarae, Didelphis paraguayensis and *Marmosa* sp.

The intraperitoneal inoculation of the same strain also gave negative results with the following :—*Sylvilagus minensis, Bradypus tridactylus, Dasyprocta aguti* and *Herpailurus pardinoides.*

The intracerebral inoculation of neurotropic virus gave negative results in the following :—*Mus musculus musculus, Epimys norvegicus, Muridae* spp., *Euphractes sexcinctus, Didelphis paraguayensis* and *Herpailurus pardinoides.*

The negative results obtained with the common wild mouse, *Mus musculus musculus,* indicate the existence in this species, as in the case of white mice, of races varying in their susceptibility to infection with yellow fever, since wild mice in other parts of the world have been found to be susceptible. *E. H.*

DA FONSECA (Flavio) & ARTIGAS (Paulo). Sensibilité du chat au virus amaril neurotrope. [**The Susceptibility of the Cat to Neurotropic Yellow Fever Virus.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 34. pp. 1143–1145.

Young cats, two to three months old, were found to be susceptible to infection with neurotropic yellow fever virus when inoculated intracerebrally. The animals showed paralysis and the infection was passaged from one cat to another and also to mice. Virus was not found in the circulation even on the third day. Young cats inoculated in various ways with the Asibi strain showed no signs of infection.

The positive results obtained by intracerebral inoculation differ from negative results obtained in Europe, and indicate that cats show considerable variation in their susceptibility to infection with the neurotropic yellow fever virus. *E. H.*

DA FONSECA (Flavio). L'hypersensibilité d'un rongeur brésilien au virus amaril neurotrope. [**The Hyper-Susceptibility of a Brazilian Rodent to Neurotropic Yellow Fever Virus.**]—*C. R. Soc. Biol.* 1938. Vol. 129. No. 34. pp. 1132–1134.

A small rodent, *Ctenomys brasiliensis* Blainville, belonging to the family Octodontidae, has been found by the author to be very susceptible to infection with neurotropic yellow fever virus. Only two specimens were obtained. The first was inoculated intracerebrally with a small dose of virus and showed paralytic symptoms 12 days later. Emulsions of blood, liver and brain were subinoculated intracerebrally into mice. The blood was negative ; one out of six mice inoculated with liver material became infected ; of three inoculated with brain material one died on the fourth day and the other two became ill on the ninth day. One of these recovered and the other was used for further passages in mice, in which it regularly produced death in four to five days. Similar results were obtained with the second specimen of *Ctenomys.* The examination of the liver of this animal showed only fatty degeneration without the typical necrosis, therefore this species does not seem to be as susceptible as the hedgehog.

E. H.

TRYPANOSOMIASIS.

Précis of Abstracts in this Section.

de Brauwere (p. 655) gives figures of the cases of sleeping sickness in the areas administered by Foréami. Standard treatment is 1 gm. germanin followed by 12 or 14 injections of tryponarsyl. Control by lumbar puncture is practicable in ambulatory treatment, and figures of the cell counts are given. In the Annual Report for 1937 of the Foréami Service it is shown how the diagnosis team works. Gland palpation is performed by Europeans, gland juice and blood examinations are made by native microscopists, under supervision. Two arsenic resistant strains have been found. Visual disturbances following arsenic treatment were investigated. European control is now concerned more with the regularity of the courses of treatment than with the technique of administering them. The epidemiology is discussed, and the value of prophylactic work demonstrated. The state of nutrition of the population is an important factor.

The report for 1937 of the Institut Pasteur Brazzaville (p. 658) discusses the findings for the year. The methods of diagnosis are detailed. Clinical signs may be obscure and blood negative in persons in whom trypanosomes may be found in the cerebrospinal fluid. The measures for dealing with the disease remain the same.

Gear and de Meillon (p. 659) and Broderick and Pijper (p. 659) report human trypanosomiasis from Bechuanaland.

Hawking (p. 660) uses the photosensitivity of trypanososmes which have absorbed acriflavine as a measure of the acriflavine in them or in the medium with which they are in contact. Broom and Brown (p. 660) show that reversals of sign of positively charged trypanosomes take place in the gut and again in the salivary glands of the fly, and of those negatively charged in the glands only. Hoare and Broom (p. 661) have applied to mixed infection their method of distinguishing between *T. uniforme* and *T. vivax*, by measurements of length. The only practicable method is that based on a minimum of 100 measurements.

Cristiani (p. 661) shows that infection through the external auditory meatus and the mucous membrane of the nose is possible with trypanosomes and certain spirochaetes. Corson (p. 662) considers that because some volunteers resisted infection, it cannot be inferred that the infectivity of the strain of *T. rhodesiense* (which had been maintained in ruminants and *G. morsitans* for 4 years) had decreased for man.

Broom (p. 662) gives a method for the maintenance of *G. morsitans* in Britain, which cannot be further abstracted.

Sicé and Torrési (p. 663) discuss the effect of climatic conditions in the French Sudan on the epidemiology of trypanosomiasis, through the influence on the biology of Glossina. They (p. 664) show that certain individual flies, especially females, survive from one favourable season to the next, and that the pupae are resistant to unfavourable conditions. Survival is thus assured.

Moreau (p. 664) discusses climatic classification, as applied to East Africa, in relation to biology. The best is one based on some function of temperature combined with the length of the wet season and the total rainfall in that season. Davy (p. 665) stresses the need for a common terminology and range of observations in the description of plant communities, and discusses the climatic and edaphic kinds of formation. These papers are of interest to workers on the biology of Glossina.

RADNA (p. 666) describes the use of the fluorescence microscope.

CORSON (p. 667), discussing complications which arose in volunteers infected with *T. rhodesiense*, considers that neither the infection nor the treatment with germanin were connected with them except in the case of albuminuria. PINARD *et al.* (p. 667) found trypanosomes in the cerebrospinal fluid of a man sent to hospital with epileptic convulsions and pruritus.

REYNES and TRINQUIER (p. 667) review the results of treatment of a community in the Cameroons which has been closely observed. Moranyl, tryparsamide and in some instances injections of the blood of successfully treated persons gave satisfactory results. VAN DEN BRANDEN (p. 668) gives details of a biological test for toxicity of germanin. BOURSNELL *et al.* (p. 668) record results obtained by their method of determining Bayer 205 in plasma, serum and urine. A course of the drug is apparently more satisfactory than a single injection of the same amount in maintaining it in the plasma over long periods.

SICÉ and TORRÉSI (p. 669) discuss the effect of synergic treatment using combinations of tartar emetic or moranyl with an arsenical. The results are excellent and the best combination is moranyl and tryparsamide. ROUSSEAU (p. 670) used mixtures of moranyl and anthiomaline in the treatment of advanced disease.

ASTRACHAN and FRANKS (p. 670) describe a patient who developed nitritoid reactions after tryparsamide although she had previously received 90 injections of that drug without ill effect. BERTÉ (p. 671) dissolves atoxyl in 10 per cent. sodium citrate solution. This prevents pain on injection.

HAWKING (p. 671) finds that atebrin is only slightly absorbed by trypanosomes and that the degree of absorption is in relation to its small trypanocidal activity.

LESTER (p. 672) describes how the inauguration of compulsory surveys and mass treatment brought to light the heavy infection of the Northern Provinces of Nigeria. He shows that field dispensaries are necessary to deal with relapses and fresh infections when the surveys are completed and that largely as a result of this measure the infection rate has fallen considerably.

JACK (p. 673) discusses controlled game destruction in the eradication of Glossina in Southern Rhodesia. Bush and thicket clearing may be necessary also in low veldt where elephant and rhinosceros are abundant and in forest belts. *C. W.*

DE BRAUWERE (P.). Vues d'ensemble sur la situation de la maladie du sommeil et de la lèpre dans les territoires sous l'action du "Foréami" durant l'année 1936. [**General Views of the Situation as regards Sleeping Sickness and Leprosy in the Territories controlled by "Foréami" during 1936.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 381–418.

The various methods adopted to combat the disease have profoundly modified the problem. Not only has the disease become less malignant, but there has also been an impressive reduction in the number of cases, and it no longer rapidly decimates entire communities. This sums up the situation in Bas-Congo, but in Kwango the situation is not so favourable. The economic recovery which is as intense in Kwango

as in Bas-Congo has only had slight local repercussions. The number of inhabitants was 1,167,175, and of these 1,156,741 were examined. New cases found during the year were 4,475 (0·4 per cent.). The number of old patients on 1st January, 1936, was 10,655, of which 4,065 were in the recently occupied sub-sectors of Kwango. The number of patients resuming treatment was 2,348 and the total number treated during the year was 17,488. The number of cases cured was 9,398 (53·7 per cent.), 425 disappeared and 396 (2·26 per cent.) died ; the number remaining on treatment was 7,270. These figures give a general idea of the anti-trypanosomiasis activity of Foréami during 1936. Much further information is given regarding the state of the disease and the measures taken to combat it in different portions of Bas-Congo and Kwango, but for details the original article must be consulted.

The standard treatment administered consisted in a preliminary injection of germanin (moranyl) 1 gm. followed by 12 or 14 injections of tryponarsyl. Interesting information is given regarding the control of treatment by lumbar puncture. This was found to be quite practicable in ambulatory treatment and was not attended by any serious accidents. In all, 63,919 punctures were made, 8,321 in Bas-Congo and 55,598 in Kwango. The number of punctures performed for diagnosis were 5,398 ; of these 4,249 were cases proved by the discovery of the trypanosomes in blood or gland juice and 1,149 were clinically suspected cases. No less than 93 to 95 per cent. of the definitely diagnosed cases were punctured. The cell count in the spinal fluid of these cases is shown in the following table. The concordance of the results obtained in the two sectors is remarkable :—

	0–5	5–10	10–50	50–100	100 and over
Bas-Congo ...	294 54·9%	111 20·7%	86 16%	12 2·2%	33 6·1%
Kwango	2,005 54%	655 17·6%	647 17·4%	150 4%	256 6·9%

The results of puncture in the suspected cases gave 25·1 per cent. of changes (289 out of 1,149). In the Bas-Congo the figures were 16·1 per cent. as against 32·9 per cent. in 1935. Details of various districts are given in a table.

The punctures of elimination totalled 9,840—679 in Bas-Congo and 9,161 in Kwango ; and the punctures of control totalled 40,863 : of these 3,599 were done in Bas-Congo and 37,264 in Kwango. Further details of these are also given. This section of the report must also be consulted in the original by those interested. *W. Yorke.*

Congo Belge : Fonds Reine Elisabeth pour l'Assistance Médicale aux Indigènes du Congo Belge. Rapport Annuel 1937. pp. 32–48. With 1 map. A.–Maladie du sommeil. [**Sleeping Sickness.**]

Sleeping sickness has always occupied the first place in the nosology of the regions under the care of Foréami. Although it is practically

non-existent in certain districts, it is a constant menace where the vectors are numerous. In certain districts, particularly Moyen-Wamba, Bas-Kwango and Bas-Kwilu, it is, however, present to such extent that the organization has to devote almost all its activity to an anti-trypanosomiasis campaign.

Particular attention has always been given by the Foréami personnel to the subject of diagnosis. Gland palpation should always be performed by the European who thus gains an approximate idea of the endemicity of the disease in the locality. The examination of the gland juice is made by native microscopists, but their work is constantly supervised by the doctor or sanitary agent. Examination of fresh and thick blood preparations and the triple centrifugation method are also done by native specialists. Other methods of examination are undertaken by the doctors or, more rarely, by sanitary agents. It is claimed that this distribution of work assures efficiency and leaves the doctors sufficient leisure for more specialized work.

Two arsenic-resistant strains have been isolated; one came from an old focus at Chenal and the other from Lukula, where arsenic-resistance has not hitherto been recognized. The latter strain, which was of moderate resistance, proved of extreme virulence for laboratory animals and is being examined by VAN HOOF. Other sporadic cases have been notified by doctors, but in the absence of more detailed study, it is impossible to be certain that these were cases of true arsenic-resistance.

An attempt has been made to ascertain the frequency of visual disturbance following treatment by arsenicals, and to determine whether these accidents were related to the age and sex of the patients. Observations made on 1,893 patients treated with tryponarsyl gave the following results :—

1. Males were more subject to visual disturbance than females, but the proportion of definite blindness was the same in both sexes.
2. The proportion of definite blindness was less than 1 per cent.
3. The frequency of accidents increased with the age of the patient.
4. Accidents were most common at the commencement of the course of treatment.

Treatment is always prescribed by sanitary agents and is administered at rural dispensaries by certificated natives. The courses of treatment have hardly been modified and the general directions are given by doctors. As a general rule, since diagnosis is made early, the courses can be standardized. Unfortunately, medical supervision of very extensive thinly populated regions has hitherto not allowed of systematic control of treatment, but the more intensive assistance now adopted will permit of this. European supervision is now concerned more with the regularity of the courses of treatment than with the technique of administering them. The efficacy of treatment is controlled by systematic re-examination of the patients during two years.

Although the phyto-geographical conditions—forests traversing plateaux more or less bare—may be identical in the whole extent of a sector, the disease is not uniformly distributed. The cause of this is discussed at some length. High endemicity is manifestly due to the nature of the occupation of the natives and to their habits. Large clearings, or the agglomeration of the people, rapidly produce a fall in the index of new cases. The endemicity is also maintained by the

continuous introduction of exogenous virus or by the insubordination of the natives who refuse re-examination ; migrations also play a part. But besides these factors there are others less well known which influence the endemicity of the disease. Medical action alone cannot explain the extremely rapid retrogressions which are sometimes noticed in certain districts, similar or even better work in neighbouring districts being followed by much poorer results. Possibly in districts where the disease has existed for a long time the individuals develop a certain degree of immunity ; and VAN HOOF has shown that a virus tends to lose its transmissibility after repeated passages through the same vertebrate host.

In the area controlled by Foréami the endemicity of sleeping sickness develops favourably. In recent foci the regression is rapid, but it is slower and less regular in old foci, and sometimes also in regions previously very heavily infected, and in places where new strains are being constantly introduced. As a result of the prophylactic work the number of new cases discovered in 1937 declined by more than 1,000. It is expected that this important regression will be maintained in future years and will be especially evident in Moyen-Wamba where the epidemic is still in full force ; in Bas-Kwango substantial progress has already been realized. In Bas-Kwilu and in Chenal, which are very old and active foci, the improvement so evident in 1936 was less marked in 1937, but will probably be resumed. In all the remaining sub-sectors the situation is very favourable.

The nutrition of the population is an important factor in the success of an anti-sleeping sickness campaign. Figures are given in support of this contention. The report ends with details of the results of examination of the population and of the treatment of the infected in the various parts of the region controlled by Foréami. *W. Y.*

BRAZZAVILLE : AFRIQUE EQUATORIALE FRANÇAISE. RAPPORT SUR LE FONCTIONNEMENT DE L'INSTITUT PASTEUR DE BRAZZAVILLE PENDANT L'ANNÉE 1937 [SALEUN (G.)]. pp. 74–100.—Service de la surveillance de la maladie du sommeil. [**Sleeping Sickness Service.**]

During the year 1937, 9 Europeans were found to be infected with trypanosomes. Of these 9, who were treated at Brazzaville, only 3 were diagnosed at the Brazzaville Institute, the remaining 6 being discovered in various parts of the Colony. Besides these 9 cases, a few others were diagnosed and treated in the Colony, and sent straight home without visiting Brazzaville. Clinical details are given regarding each of the 9 cases dealt with at Brazzaville.

Among the natives 148 new cases of sleeping sickness were dealt with at Brazzaville, as compared with 239 during the previous year. But this does not necessarily imply that the disease is decreasing. The 148 cases are made up as follows :—discovered by itinerant missions 50, sent by dispensaries 46, sent by hospitals 17, came themselves 35. Attention is drawn to the fact that in 1936, 29,197 persons were examined by the itinerant missions and 239 cases discovered (0·81 per cent.), whilst in 1937, 8,216 persons were examined and 50 cases discovered (0·61 per cent.). In a table details are given regarding the regions in which these cases were discovered ; the index of infection was small, except in Couloir, where it was 2·2 per cent.

Emphasizing the importance of early diagnosis, the report gives information regarding the means by which the trypanosomes were found and a diagnosis made. In 10 cases trypanosomes were found only in the gland juice ; in 5 cases diagnosis was made by examination of thick blood films, the triple centrifugation method being negative ; in 6 cases triple centrifugation was positive but thick blood films negative ; in 70 cases both triple centrifugation and thick films were positive ; and in 32 diagnosis was made by lumbar puncture, both blood and glands being negative.

Clearly, then, it is not uncommon to find that in the nervous period the glands have shrunk and the parasites have disappeared from the peripheral circulation, but they multiply readily in the central nervous system. In this stage the clinical signs are not always obvious, and it is necessary to interrogate the patient closely. These results show that the various methods of examination of the patient for trypanosomes are complementary to one another and must often be practised simultaneously, lumbar puncture being reserved for those in whom trypanosomes are found and for suspects, *i.e.*, persons with glands without parasites and with suspicious signs or history.

Information is given regarding the stage of the disease in the new cases at the time of their discovery and of their treatment ; and some details are recorded of old patients who died during the year. The general conclusion reached is that the problem of sleeping sickness has not changed ; the measures for dealing with it remain the same, and there does not seem to be any necessity to modify them. *W. Y.*

Gear (J. H. S.) & de Meillon (B.). **Laboratory Investigations of Two Cases of Trypanosomiasis contracted in Ngamiland, Bechuanaland.**—*South African Med. Jl.* 1939. Apr. 8. Vol. 13. No. 7. pp. 233–236.

Details are given of two cases of sleeping sickness contracted in Ngamiland, Bechuanaland. Investigation showed the trypanosome to be *T. rhodesiense*. The fly responsible was *G. morsitans*. The authors state that the discovery of these cases reveals an endemic focus of the disease in an area further south than any hitherto reported.

W. Y.

Broderick (M. J.) & Pijper (Adrianus). **A Case of Sleeping Sickness from Bechuanaland.**—*South African Med. Jl.* 1939. Feb. 25. Vol. 13. No. 4. pp. 127–128. With 2 figs.

Clinical details are given of a case of trypanosomiasis contracted in the neighbourhood of Maun in Bechuanaland. There is nothing of importance about the case except the locality in which it was contracted. *W. Y.*

Swartzwelder (J. Clyde). **Consideration of the Classification of Trypanosomes, with Special Reference to the Classification of Jacono.**—*Jl. Trop. Med. & Hyg.* 1938. June 1. Vol. 41. No. 11. pp. 182–187. With 3 figs.

In this paper the author undertakes to explain and clarify the proposed new classification of trypanosomes which has been propounded in a number of Italian publications by Jacono. It is perhaps significant

that he is careful to state that he has done this without presenting his personal viewpoint. This article in English will be a convenience to those who are unable to read the original papers of the author of the new scheme. *C. M. Wenyon.*

HAWKING (Frank). **A Quantitative Study of the Photosensitivity induced in Trypanosomes by Acriflavine.**—*Ann. Trop. Med. & Parasit.* 1938. Dec. 21. Vol. 32. No. 4. pp. 367–381. With 4 figs.

JANCSÓ showed that when trypanosomes have absorbed acriflavine they become photosensitive, in that they soon became motionless and presumably dead when exposed to strong light on the stage of a dark-ground-illumination microscope. In the present paper, Hawking describes a quantitative investigation of Jancsó's technique, so that it can be used to measure the quantity of acriflavine in the trypanosomes or in the medium with which they are in contact.

The following is the summary of this somewhat technical paper :—

"1. When trypanosomes are exposed to acriflavine *in vitro* or *in vivo*, they become photosensitive, owing to their absorption of the compound. The degree of photosensitivity can be measured quantitatively on the stage of a dark-ground microscope as the period of illumination required to cause immobilization.

"2. Equations are given for (1) the relation between the photosensitivity and the initial concentration of acriflavine in the medium, and for (2) the relation between the photosensitivity and the acriflavine-content of the trypanosomes. These equations enable the photosensitivity to be used to measure low concentrations of acriflavine (0·2–0·001 γ per ml.), or to indicate the acriflavine-content of small numbers of trypanosomes ; the accuracy is about 30 per cent.

"3. The resistant strain of trypanosomes shows a smaller range of individual variation than the normal one, the coefficient of variation in the resistant strain being 22 per cent. and in the normal strain 33 per cent."

W. Y.

BROOM (J. C.) & BROWN (H. C.). **Studies in Trypanosomiasis. III.—The Electric Charge of Trypanosomes in the Salivary Glands of Tsetse Flies.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 545–548.

In a previous paper [this *Bulletin*, 1937, Vol. 34, p. 930] the authors have shown that the electric charge of the developmental forms of *T. brucei* in the gut of *G. morsitans* is invariably negative, irrespective of the sign of the charge of the trypanosomes in the animal host on which the fly was fed. As the strain with which they were then working proved to be incapable of complete development in the fly, the authors were unable to study the electric charge of the trypanosome throughout its entire cycle. They have, however, now been able to complete their observations on a new transmissible strain of *T. brucei*.

It has been proved that, when positively charged trypanosomes are ingested by a tsetse, one reversal of the sign of the charge takes place in the gut of the fly, and a second reversal in the salivary gland. With negatively charged trypanosomes the only reversal occurs in the salivary gland. In both instances the blood trypanosomes of rats infected by the fly are predominantly positively charged. *W. Y.*

JERACE (Felice). Sulla morfologia della *Castellanella brucei*. [**Morphology of *Trypanosoma brucei*.**]—*Ann. d'Igiene.* 1938. Sept.–Oct. Vol. 48. No. 9–10. pp. 555–559. With 1 text fig. & 12 figs. on 2 plates.

A strain of *Trypanosoma brucei* (referred to as *Castellanella brucei*) has been studied in various laboratory animals. It is concluded that the trypanosome exhibits an extreme polymorphism but this is based largely on observations on what are undoubtedly degenerating forms which cannot in any way be regarded as occupying a place in the normal morphology of the flagellate. *C. M. Wenyon.*

HOARE (C. A.) & BROOM (J. C.). **Morphological and Taxonomic Studies on Mammalian Trypanosomes. VII.—Differentiation of *Trypanosoma uniforme* and *T. vivax* in Mixed Infections.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 629–632. With 1 fig.

In a previous paper [this *Bulletin*, 1938, Vol. 35, p. 701] the authors have shown that *T. uniforme* and *T. vivax* can be distinguished by differences in the mean and range of their lengths, and that the measurement of the length of 10 individuals selected at random in any strain is sufficient for the identification of the species to which the trypanosome belongs.

The correctness of this method was verified in the case of some strains of these trypanosomes, preparations of which were sent to the authors by VAN HOOF from the Belgian Congo. In all these cases, the authors were dealing with pure infections, and until recently they have not had an opportunity of testing the statistical methods in mixed infections with the two species. Since the two trypanosomes differ only in length, the identification of such infections by simple inspection is unreliable and inconclusive. This has been the experience of other observers, and the authors encountered the same difficulty in the case of blood films from a situtunga received from CARMICHAEL of Entebbe. The majority of the trypanosomes were small and conformed to the appearance of *T. uniforme*, but some were longer and were apparently *T. vivax*.

In a table and histogram the frequency in distribution of 100 trypanosomes in respect of length is shown, from which it appears that *T. uniforme* contributed 82 per cent. of the infection and *T. vivax* 18 per cent. That it was possible to differentiate the trypanosomes in a double infection affords further evidence of the independence of the two species of the *vivax* group.

The authors emphasize that the only practical method for determining mixed infections with these trypanosomes is that based on a minimum of 100 measurements. *W. Y.*

i. CRISTIANI (Michelangelo). Infezioni da tripanosomi e spirochete per via auricolare. Ricerche sperimentali. [**Experimental Infections with Trypanosomes and Spirochaetes by the Auricular Route.**]—*Arch. Ital. Sci. Med. Colon. e Parassit.* 1938. July. Vol. 19. No. 7. pp. 406–415. [14 refs.]

ii. ——. Sulla permeabilità della mucosa nasale per alcuni protozoi (tripanosomi, spirochete, spirelle). [**Permeability of the Nasal Mucosa for Trypanosomes and Spirochaetes.**]—*Ibid.* pp. 416–429. [40 refs.]

i. The first paper describes experiments wherein the author has succeeded in infecting guineapigs and mice with various pathogenic

trypanosomes and relapsing fever and rat bite fever spirochaetes by introducing infective material into the external auditory meatus. The infections thus produced differed little from those resulting from subcutaneous inoculations.

ii. In the second paper similar experiments carried out on the nasal mucosa are recorded. Both trypanosomes and relapsing fever spirochaetes are able to pass through the intact mucous membrane of the nose [see also this *Bulletin*, 1939, Vol. 36, p. 111].

C. M. Wenyon.

CORSON (J. F.). **A Fifth Note on the Infectivity to Man of a Strain of *Trypanosoma rhodesiense*: Three Further Passages through Antelopes and Tests on Man; Two Charts of the Whole Experiment.**—*Jl. Trop. Med. & Hyg.* 1939. Jan. 2. Vol. 42. No. 1. pp. 5–7.

The preceding note [this *Bulletin*, 1939, Vol. 36, p. 208] carried the record of this experiment to March and April, 1938. In the present paper three further transmissions by *Glossina morsitans* through antelopes, each followed by infection of a volunteer, are recorded; and two charts are given showing the passages and tests on man from the beginning of the experiment in October, 1934, to October, 1938, when the strain was still infective to man. Corson concludes his paper with the following comment:—

"As I have said in previous papers, in my opinion only positive results should be taken into consideration regarding the infectivity to man of this strain of *T. rhodesiense*. Because some volunteers resisted infection it cannot be inferred that the infectivity of the strain to man has become less during maintenance in ruminants and *Glossina morsitans* for four years. It seems that it must be very difficult to demonstrate a decrease of infectivity to man, and practically impossible to prove that a strain has lost its infectivity to man."

W. Y.

BROOM (J. C.). **The Maintenance of *Glossina morsitans* in England for Experimental Work.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 633–638. With 1 chart.

The data presented in this note were accumulated in the course of a study of the developmental cycle of *T. brucei* in *G. morsitans*. The method which proved most satisfactory for the maintenance of the tsetse in Britain is briefly as follows:—

Pupae of *G. morsitans* were received by air mail from Tanganyika in batches of about 2,000 at fortnightly intervals. The pupae were enclosed in a bag of mosquito netting, which was placed in a wooden box with six holes $\frac{1}{8}$ in. in diameter bored in each face of the box to ensure a supply of fresh air during the five days' journey. A certain number of flies always hatched out on the journey, but most of them were dead on arrival.

Pupae were distributed in two or three glass jars, 4 in. deep and 4 in. wide, the tops of the jars being covered with mosquito netting. Each jar was stood in an 11 in. Petri dish containing a saturated solution of common salt to maintain a humidity of 80 per cent. saturation; the whole was covered with a large bell-jar and kept at a temperature of approximately 24°C. The great majority of the flies

were hatched in an insectarium lighted by daylight, but it was found by experiment that artificial light is equally effective in causing development of the wings. From the 58,000 pupae received, about 13,500 flies emerged, *i.e.*, approximately 23 per cent.

The flies were collected every 2nd day and placed, 4 or 5 together, in glass tubes, 4 in. by ¾ in., one end of which was covered with mosquito netting, and the other end closed with a cork. These tubes were applied to infected rats and the flies given an opportunity to feed. The fed flies were then separated and placed, in tens, in glass cylinders 4 in. by 2¾ in., the ends of which were covered with mosquito netting. Each cylinder thus contained flies all known to have had an infective feed on the same day. The unfed flies were returned to the small tubes and given a further opportunity to feed.

The complete developmental cycle of the strain of *T. brucei* used in these experiments occupied at least 25 days. During the first three weeks after the infective feed the flies were therefore fed thrice a week on clean guineapigs; thereafter they were fed at the same intervals on chickens. The cylinders containing the fed flies were kept at a constant temperature of 24° to 25°C. in a humidity of about 80 per cent. saturation.

The survival of a population of 10,000 *G. morsitans* during the first five weeks of life after the infective feed, is shown in a table. On the 10th day there were 7,532 flies alive, on the 20th day, 5,575, on the 30th day, 4,038, and on the 35th day, 3,423. The same data are set forth graphically in curves, one curve showing the survival of the flies kept under better conditions, and the other the survival of those kept under worse conditions. The difference in the relative number surviving was found to be marked throughout; whereas fully one-third of the flies lived for 5 weeks under the better conditions, less than one-tenth reached that age in the other case. *W. Y.*

Sicé (A.) & Torrési (F.). Considérations sur l'épidémiologie, l'évolution clinique et la prophylaxie de la trypanosomiase humaine au Soudan Français. [**Notes on the Epidemiology, Clinical Evolution and Prophylaxis of Human Trypanosomiasis in the French Sudan.**]—*Bull. Soc. Path. Exot.* 1939. Jan. 11. Vol. 32. No. 1. pp. 88–93.

The climatic conditions of the French Sudan are responsible for certain epidemiological characters which are not met with in the sleeping sickness of French Equatorial Africa.

The pathogenic agent is *T. gambiense*, but sometimes trypanosomes were found in the blood or spinal fluid of patients which, when introduced into guineapigs, exhibited a polymorphism recalling that of *T. rhodesiense*. The tsetse found were *G. tachinoides*, *G. palpalis* and *G. morsitans*; in the valleys of the black Volta and of the Bani the predominant species in the dry season is *G. tachinoides*. Numerous authors have drawn attention to the influence of atmospheric conditions—vapour tension and temperature—on the biology of Glossina in different countries. This influence is very apparent in French Sudan.

Details are given in a table of the atmospheric humidity and temperature during the months of the dry season, viz. December to April, and also during the wet season, June to August. The variations in the atmospheric conditions and their influence on the density of

Glossina and on the relative number of the different species, confirm the findings of NASH, BUXTON, and LLOYD in Northern Nigeria. [See also this *Bulletin*, 1934, Vol. 31, p. 216; 1935, Vol. 32, pp. 369, 723; 1937, Vol. 34, pp. 533, 109–111.] *W. Y.*

SICÉ (A.) & TORRÉSI (F.). Considérations sur l'épidémiologie et la prophylaxie de la trypanosomiase humaine au Soudan français. [**Considerations on the Epidemiology and Prophylaxis of Sleeping Sickness in the French Sudan.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 154–156.

The fight against Glossina in the Sudan does not appear to be any easier than in other countries. Although their permanent haunts are more circumscribed than in Equatorial Africa, and the more severe climatic conditions compel the insects during 4 or 5 months of the year to take shelter in their permanent haunts, one is faced with the same difficulties in the Sudan as elsewhere. Certain individual flies ensure the survival of the species from one favourable season to the next, a relatively large number of females survive, and the pupae are resistant to unfavourable climatic conditions.

The authors discuss the methods which they found most useful for destroying the insects and their pupae, and emphasize that such methods as clearing of bush must be carried out under skilled direction.

W. Y.

MOREAU (R. E.). **Climatic Classification from the Standpoint of East African Biology.**—*Jl. Ecology.* 1938. Vol. 26. pp. 467–501.

Faunal zones are associated with vegetational formations limited by climate. Though the eco-climate is ultimately fundamental it may increasingly be deduced from standard climate. Climatic maps for East Africa have yet to be made. Characteristics of the area are complicated relief; slight annual but high daily range of temperature; rarity of frost, at least in screens; and marked droughts in which most of the soil moisture is lost in the first month, causing relatively insignificant loss in the later intensely dry months of biological rest.

Köppen's climate classification groups together in East Africa cultivated areas and those where agriculture is impossible, and Scaëtta's modification for Ruanda is of too local application. Generally, seasonal incidence of rainfall is accorded too little weight, and this may be true also of Meyer's rainfall-saturation deficit ratio. Evaporation data are here too scanty to be used.

Rainfall-temperature relations have been employed, but high temperature does not necessarily indicate dryness. Thus Lang's division of mean temperature into total rainfall takes no account of dry periods, and De Martonne's similar index, where, however, 10 is added to the mean temperature, gives too low thresholds for both "dry farming" and forests in East Africa. Emberger divides total rainfall by a function of median temperature combined with extreme range, because high range may indicate dryness; but the validity of a function twice introducing minimum temperature, which is less important than dew point, is doubtful.

Crowther's "leaching factor" is founded on too local data; and Andrews and Maze, though allowing for dry months, ignore residual effects of rainfall, so that parts of East Africa on their system appear too "dry."

Generally, extremes are more important than climatic means, especially where rainfall is low or sharply seasonal. Use of median instead of mean temperature, or the application of the standard deviation as a measure of variability, is objectionable because very low is probably more important biologically than very high rainfall, and altered distribution with unchanged total fall affects desiccation.

Rainfall effectiveness is also governed by interception and run-off and this in turn by the nature of the soil. Mist and cloud, by affording shade and causing "horizontal precipitation," often permit the occurrence of forest where rainfall is low.

Mean annual temperature in East Africa is determined by altitude, excepting local variations near the sea and Lake Victoria. Except where local topography plays its part, the tropical zone extends up to 4,000 ft., and the highland zone from 6,000 ft., above the mean temperature isotherm of 18°C. Between lies an intermediate zone.

Rainfall below 40 mm. in a month is probably ineffective, and when a month over 40 mm. occurs in a long dry period it should be discounted.

In default of evaporation data, the best available classification for East Africa is one based on some function of temperature combined with the length of the wet season and the total rainfall in that season. But such a system will still be defective because it takes no account of climatic extremes, "horizontal precipitation" caused by mist, and rainfall effectiveness governed by the total fall and by the nature of the soil.

[It seems that, in default of evaporation data, more work should be done to elucidate the relation of evaporation to saturation deficit, which may prove to be simple. Failing this, Emberger's system may receive more consideration, since, though range of temperature may be biologically insignificant, the dryness which it indicates is not. Further, extreme dryness may well be a concomitant of very long dry periods, which therefore on such a system are not entirely ignored.

A comprehensive bibliography is an extremely useful feature of this paper.] *C. H. N. Jackson.*

Davy (J. Burtt). **The Classification of Tropical Woody Vegetation-Types.**—Imperial Forestry Institute. University of Oxford. Institute Paper No. 13. pp. v+85. 1938. [2*s.* 6*d.*]

This paper is the work of a forest botanist, who wishes to standardize the classification of types of tropical woodland. The problem of naming and defining such things as "savannah," "orchard-bush," "miombo," and "kurimi" is familiar to those entomologists who work on Glossina. The present work will help to keep them in line with what the botanists are doing.

The author stresses the need for a common terminology and a common range of observations in the description of plant communities. Nomenclature such as that of Clements for successional stages is rejected pending further knowledge, but a distinction is made between temporary disturbance (cultivation, etc.) and long-term trends.

For primary classification, Schimper's arrangement based on aerial factors is preferable to Warming's which was based on edaphic factors, *i.e.* differences in type of soil. A useful tabular comparison of Chipp's and Champion's modifications is given.

The plant " association " is defined as the largest unit of a definite assemblage of species : the " formation " as a group of associations with both a common physiognomy and a common aerial habitat. A formation *type* is a group of formations with a common physiognomy. In the summary, however, these definitions are not sustained. The formation is there stated to be of two kinds, namely climatic, governed by aerial factors, and edaphic, governed by soil and drainage. The first covers large areas and the second is of purely local occurrence and of different physiognomic form. Further, the formation is sometimes defined as necessarily a climax and elsewhere (climatic formation) as not necessarily a climax. The edaphic formation is regarded as possibly a sub-formation only, since it may be only a part of the climatic formation. It is not clear from this why the edaphic formation or sub-formation should not be regarded as an association.

The body of the paper consists of a description of 17 tropical formations, divided into the formation types of moist and dry woodland, grassland and desert, with many sub-formations. There appears to be nothing to cover the unique deciduous scrub climax of East Africa, dominated by a closed woody thicket association from which grass is absent.

Besides a bibliography and a " skeleton glossary," there is a list of data to be recorded in the field, to provide mainly qualitative answers to more than 150 questions. For the benefit of those foresters unable to deal with all these, the questionary is divided into three parts :—

1. Synecology includes qualitative and quantitative composition of the community, its physiognomy, phenology, and " biotic " (actually zoological) relations. The biotic questions refer only to termites and to bird and other animal distributors of fruits and seeds : it seems that the grazing, trampling and manuring caused by the ungulates and other animals might recommend their consideration.
2. Autecology covers specific dimensions and morphology, phenology and regeneration.
3. Under habitat are included the physical factors, both climate and soil, and " biotic features," all but one of these last questions relating to some form of human interference.

C. H. N. Jackson.

Penso (Giuseppe). I fenomeni immunitari nelle tripanosomiasi. Studio monografico. [**Immunity in Trypanosomiasis.**]—*Rendiconti Istituto di Sanità Pubblica.* Rome. 1938. Vol. 1. Pt. 3. pp. 931–1078. [459 refs.]

Radna (R.). La microscopie de fluorescence comme mode de recherche du bacille de la lèpre et des trypanosomes. [**Fluorescent Microscopy as a Method of Examination for the Lepra Bacillus and Trypanosomes.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 623–628. [11 refs.]

Reichert in 1911 constructed a fluorescence microscope, but the illumination was so poor that it would not allow of high magnifications. Later, however, this difficulty was overcome. The organisms are treated with fluorescent reagents, *e.g.* in the case of trypanosomes—trypaflavine, 2-p-acetylaminostyryl 6-dimethylaminoquinolin methosulphate, or coryphosphine. The author claims that this method facilitates the search for trypanosomes in the blood. *W. Y.*

Fournials. Des erreurs de diagnostic en matière de trypanosomiase. [**Errors of Diagnosis in Trypanosomiasis.**]—*Rev. Prat. Malad. des Pays Chauds.* 1938. Sept. 17th Year. Vol. 18. No. 9. pp. 412, 415–16, 419–20, 422–8.

In this note the author discusses the reasons for failure to reach a correct diagnosis in human trypanosomiasis. He illustrates his points by brief clinical summaries of 23 cases. The article, which contains nothing new, must be consulted in the original by those interested.

W. Y.

Corson (J. F.). **A Record of Some Complications which occurred in the Course of Experimental Infections of African Volunteers with** *Trypanosoma rhodesiense.*—*Ann. Trop. Med. & Parasit.* 1938. Dec. 21. Vol. 32. No. 4. pp. 437–443.

In this paper the author records a somewhat high incidence of complications which occurred in the course of experimental exposure to *T. rhodesiense* infection of 43 African volunteers during 1937 and 1938; of these, 28 became infected and 15 resisted infection. Each volunteer, except Nos. 8, 9 and 10, was exposed to infection by the bite of a single infective *Glossina morsitans*. All were treated, whether infected or not, and germanin alone was used, in 1 gm. doses, given intravenously. A number of notes are given regarding each of the 43 cases.

Corson states that there is no reason to think that either the infection with trypanosomes or the treatment with germanin had anything to do with the complications, except with the albuminuria. The more serious complications fortunately occurred after the third or fourth dose of germanin, so that the infection with trypanosomes could be regarded as cured before the complication appeared. *W. Y.*

Pinard (M.), Brumpt (L.) & Raymondeau (M.). Présentation d'un malade atteint de trypanosomose révélée tardivement par des convulsions et du prurit. [**A Case of Trypanosomiasis Diagnosed Late by Convulsions and Pruritus.**]—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1939. Mar. 6. 55th Year. 3rd Ser. No. 7. pp. 324–327.

The patient, a native 32 years of age, was sent to hospital suffering from epileptic convulsions and pruritus. A diagnosis of nervous syphilis was made and a lumbar puncture performed. The fluid gave a positive Wassermann reaction; but the authors were impressed by the excess of protein, and especially by the cell count of 1,800 per cmm. On centrifuging, trypanosomes were found, and also morular and other abnormal cells. Examination of blood and bone-marrow was negative; the glands were not puncturable. *W. Y.*

Reynes (V.) & Trinquier (E.). Réflexions à propos de quelques résultats de traitement de la trypanosomiase humaine dans un centre de brousse. [**Reflections on Some Results of Treatment of Sleeping Sickness in the Bush.**]—*Bull. Soc. Path. Exot.* 1938. Dec. 14. Vol. 31. No. 10. pp. 955–968. [17 refs.]

In this article the authors review the results obtained by them in the treatment of sleeping sickness at one of the districts (Tibati) in the Cameroons, where the patients have been observed closely for

a sufficiently long period. Tibati has been visited regularly since 1934; the disease was not found outside Tibati in its immediate vicinity. In November 1934, 2,393 people were examined and 230 cases found; in April 1935 the cases treated were re-examined and 64 new cases found. In November 1935 there was a second inspection of the treated cases and 91 new ones were found among the 3,680 examined. In April 1936 there was another inspection of the treated cases and 16 new ones were found. At later examinations 65 new cases were discovered in 1936, and 20 in 1937.

A description is given of the various methods of treatment administered. At first almost all the patients received 1 or 2 injections of 2 cgm. per kilo. of atoxyl followed by 12 to 15, or even 18, injections of 5 cgm. per kilo of tryparsamide at weekly intervals. Later, orsanine replaced atoxyl, the patients in the first stage receiving 1·5 cgm. per kilo. of the drug; those in the second stage were given 3 doses of moranyl (0·5, 1·0 and 1·5 gm.), followed by tryparsamide. Sometimes the drugs were given in association, and in certain cases which failed to react the blood of a successfully treated case was also given intramuscularly.

Details are given regarding 200 cases treated in the bush in this way which were followed up for a period of 2 years. Of these cases, 69 at the time of diagnosis were in the first stage with normal spinal fluid; of these, 45 were cured by a single course of treatment, 15 relapsed and 6 passed into the second stage. Of the 131 with altered spinal fluid at the time of diagnosis, the spinal fluid became normal in 87; of the remainder 16 improved, 17 remained stationary, 2 became worse, and 9 died. *W. Y.*

VAN DEN BRANDEN (F.). Over de biologische proef van "Bayer" 205 of Germanine en gelijksoortige produkten: 309 "Fourneau" of Moranyl en Belganyl. [**The Biological Examination of Bayer 205 and the Similar Products.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Dec. 31. Vol. 18. No. 4. pp. 687–692. French summary.

The author points out that, although international standards exist for the arsenical products, nothing has been done in the case of Bayer 205. As the result of his own observations, he lays down as a test for toxicity that if 8 white mice of 20 gm. each be given subcutaneously 1·5 cgm. dissolved in 1 cc. of saline, 6 of the animals should be alive and well 15 days later.

As a therapeutic test, he considers that if 8 white mice of 20 gm. weight be given subcutaneously 0·1 mgm. dissolved in 1 cc. of saline 24–36 hours after infection with *T. brucei*, 6 ought to be sterile 20 days later. *W. Y.*

BOURSNELL (John Colin), DANGERFIELD (William Gardiner) & WORMALL (Arthur). **Studies on Bayer 205 (Germanin) and Antrypol. III. Further Observations on the Method of Determination and on the Retention of this Drug in the Animal Body.**—*Biochem. Jl.* 1939. Jan. Vol. 33. No. 1. pp. 81–89. With 1 fig. [10 refs.]

This paper, which is of a somewhat technical nature, must be consulted in the original by those interested. The following summary is given:—

" 1. Further observations have been made on the method of determination of Bayer 205 (or Antrypol) previously described [Dangerfield *et al.* 1938]. The technique has been simplified by the preparation of coloured discs for a Lovibond comparator.

" 2. Plasma and serum obtained from a Bayer 205-containing blood contain the same amount of the drug.

" 3. A modification of the method has been devised for the determination of small amounts of Bayer 205 in urine. The difference between the values for the urine and an ultrafiltrate obtained by filtration through a standard collodion membrane is a measure of the Bayer 205 present. This difference gives a minimum value which can be rendered more accurate by the use of a correction value. This factor is usually between 1·10 and 1·25, and it can be determined quite easily.

" 4. Investigations have been carried out which support the suggestion made in a previous paper that a course of injections of the drug results in a more satisfactory maintenance of a significant amount of Bayer 205 (or Antrypol) in the plasma over a long period than does a single injection of the same total amount.

" 5. Some possible reasons for the long retention of the drug in the plasma are tentatively discussed."

[See also this *Bulletin*, 1938, Vol. 35, p. 714.] *W. Y.*

Sicé (A.) & Torrési (F.). L'application des synergies médicamenteuses au traitement de la trypanosomiase humaine. [**Synergic Medication in the Treatment of Human Trypanosomiasis.**] —*Bull. Soc. Path. Exot.* 1938. Dec. 14. Vol. 31. No. 10. pp. 946–954.

The authors have tested the effect of synergic treatment on cases of sleeping sickness in the French Sudan. They state that the conception of synergic medication rests on the full utilization of the potential therapeutic power of each of the substances used in association. The action of the one is not added to that of the other; it is not a question of addition, but of multiplication of the properties of the drugs injected simultaneously. Examination of synergy requires therefore :—

The simultaneous injection of different compounds.

The abandonment of large therapeutic doses.

The utilization of doses insufficient to determine a cure by either substance alone.

The combinations employed by the authors were tartar emetic and an arsenical; or, more rarely, moranyl (germanin) and an arsenical. As a general rule, blood and gland infections were treated by tartar emetic and trypoxyl (atoxyl)—tartar emetic ·02 gm. to ·05 gm., trypoxyl ·5 gm. to ·6 gm., and, exceptionally, ·75 gm. In patients exhibiting signs of irritation of the meninges, trypoxyl was replaced by orsanine and sometimes by tryparsamide; the tartar emetic was given in the above-mentioned doses and the orsanine or tryparsamide in doses of 1·0 gm. to 1·5 gm. Finally, where there were signs of meningo-encephalitis, tartar emetic and tryparsamide were employed in the same doses; but sometimes when this failed the combination moranyl-tryparsamide was used—moranyl in ·5 gm. doses and tryparsamide in doses of ·8 gm. to 1·5 gm. The patients were treated every four days.

Protocols of a number of typical observations are given in some detail. The patients are divided into 2 groups, *i.e.*, those treated at

dispensaries and those who came up regularly for treatment. All cases were diagnosed in June and July 1937, and were under observation up to July and August 1938.

Group 1. A.—Cases with peripheral infection: of the 22 cases treated with tartar emetic-trypoxyl, and kept under observation for the full period, all were apparently well without signs of infection.

B.—Cases with nervous involvement: of 32 with meningeal reaction and treated with tartar emetic-tryparsamide, 30 (94 per cent.) were well, with normal spinal fluids and without signs of infection, and 2 (6 per cent.) had trypanosomes in the blood. Of 37 meningo-encephalitic cases treated in the same way, 5 had died and 6 had disappeared; 18 of the remaining 26 exhibited no signs of disease and 8 remained in *statu quo* or were worse.

Group 2. A.—Cases with peripheral infection: of the 41 patients treated with tartar emetic-trypoxyl and kept under observation for the full period, all were cured.

B.—Cases with nervous involvement: of the 90 patients with meningeal reaction 63 (70 per cent.) were apparently cured, 14 (15·55 per cent.) showed an increase of cells in the spinal fluid, but no increase of protein, 13 (14·44 per cent.) had got worse. Of the 97 patients with meningo-encephalitis, 68 were kept under observation, and 11 (11·33 per cent.) had died, 37 (54·41 per cent.) were apparently normal and 31 (45·88 per cent.) were either no better or worse.

The authors conclude from this work that synergic treatment gives excellent results. The best mixture is moranyl and tryparsamide, but the combinations tartar emetic-trypoxyl or tartar emetic-orsanine are also valuable. *W. Y.*

Rousseau (G.). Quelques essais de traitement de trypanosés chroniques par le mélange anthiomaline-moranyl. [**Attempts at the Treatment of Chronic Trypanosomiasis with Anthiomaline-Moranyl Mixture.**]—*Ann. Soc. Belge de Méd. Trop.* 1939. Mar. 31. Vol. 19. No. 1. pp. 73–80.

The firm of Specia provided the author with two powders: (A) consisting of moranyl 10 gm.+anthiomaline 0·6 gm., and (B) of moranyl 10 gm.+anthiomaline 1·8 gm.

Powder B can be injected into man in doses of 0·25 to 0·5 gm., and probably even of 1 gm. without trouble. Powder A can be given in doses of 1 gm. or more without danger. Details are given concerning 8 advanced cases treated by these mixtures. The injections were made at intervals of 4 days until 10 had been given. They caused no trouble apart from the fact that some of the patients developed albuminuria after the 4th or 5th injections. Some of the cases appear to have been improved, others not. *W. Y.*

Astrachan (Girsch) & Franks (Andrew G.). **Nitritoid Reaction following an Injection of Tryparsamide.**—*Arch. Dermat & Syph.* 1938. Dec. Vol. 38. No. 6. pp. 949–950.

Details are given of a case of cerebrospinal syphilis exhibiting nitritoid reactions after injection of tryparsamide. The patient had previously received ninety injections of tryparsamide (1 to 2·5 gm.) without any ill effect, and had also tolerated injections of neoarsphenamine and a bismuth preparation. On February 11th, 1937, she

stated that she felt nauseated for a while and noticed a mild swelling and redness of the face, which lasted a few minutes, after the previous week's injection of 2 gm. of tryparsamide. In view of this, the dose was reduced to 1 gm. and the patient was carefully observed while the injection was being given. Immediately after the injection she complained of a tickling sensation in the throat, and nausea and pain in the stomach. Three minutes later the conjunctivae became suffused and a diffuse redness spread over the face and neck. Intense coughing followed, and the patient complained of a choking sensation in the throat, heaviness in the chest, a feeling of swelling of the face and a burning sensation in the eyes. All these symptoms disappeared in fifteen minutes.

Tryparsamide was then discontinued, but renewed seven months later after a prophylactic course of liver extract. Injections of 0·5 and 1 gm. of tryparsamide were then well borne, but when 1·2 gm. of the drug was administered the patient complained of sudden weakness and nausea, and presented redness and oedema of the face, and mild conjunctivitis. A few minutes later a localized urticaria-like eruption developed and this was followed by a diffuse erythema of the whole body. This eruption disappeared in one or two days, and the patient felt perfectly well. *W. Y.*

VAN DEN BRANDEN (F.) & POTTIER (R.). Essais de perfectionnement du contrôle biologique des glyphénarsines (Tryparsamide, Tryponarsyl, Novatoxyl, Trypothane). [**Attempts to perfect the Biological Control of the Glyphenarsines.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 299–311. With 1 fig. [11 refs.]

This work on tests for the toxicity of the glyphenarsines all appears to have been published elsewhere, and has already received notice in this *Bulletin* [1933, Vol. 30, p. 786; 1934, Vol. 31, p. 207; 1936, Vol. 33, p. 201; and 1938, Vol. 35, p. 349]. *W. Y.*

BERTÉ (M.). Procédé pour rendre indolores les injections sous-cutanées d'atoxyl. [**Procedure for Rendering Painless Subcutaneous Injections of Atoxyl.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 180–181.

The author has been impressed with the number of patients who objected to subcutaneous injections of atoxyl on account of pain. The method of mixing the drug with the citrated blood of the patient apparently obviated this difficulty. It then occurred to Berté that, as the pain of intravenous injection of 90 per cent. alcohol is completely suppressed by sodium citrate, possibly this substance might prevent the pain due to subcutaneous injections of atoxyl. The present method adopted by the author is to dissolve the dose of atoxyl in 10 per cent. solution of sodium citrate, and he has been assured by patients that this simple device suffices to prevent pain. *W. Y.*

HAWKING (Frank). **A Note on the Trypanocidal Action of Atebrin in Relation to its Absorption by Trypanosomes.**—*Ann. Trop. Med. & Parasit.* 1938. Dec. 21. Vol. 32. No. 4. pp. 383–386.

FISCHL and SINGER, and later OESTERLIN, described experiments showing that atebrin was absorbed by trypanosomes but that it

exerted no trypanocidal action; from which they concluded that, although the absorption of a chemotherapeutic agent is a necessary preliminary to its parasiticidal action, it is not identical with it.

Hawking has reinvestigated this matter, using the technique described by the reviewer and his colleagues, and has reached the conclusion that atebrin is but slightly absorbed by trypanosomes, and that its degree of absorption is in relation to its small trypanocidal activity. *W. Y.*

LESTER (H. M. O.). **The Results of Sleeping Sickness Work in Northern Nigeria.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Feb. 28. Vol. 32. No. 5. pp. 615–627.

In this paper the author gives an interesting summary of the results of sleeping sickness work in Northern Nigeria during the last few years. Prior to the appointment of special sleeping sickness medical officers in 1927, a few hundred cases were treated each year at general hospitals and at Sherifuri. Between 1928 and 1930 sleeping sickness officers toured parts of the Northern Provinces, treating such cases as came to them to the number of 3,000 to 4,000 a year, but, as it was difficult for a touring medical officer to stay in any village for more than a short time, few patients completed treatment.

In 1930, every effort was made to persuade patients to attend regularly for a full course of injections. No attempt was made at compulsory examination, and treatment was voluntary. Towards the end of 1930, the system of compulsory surveys and mass treatment was inaugurated. It soon became evident that a large part of the central region of the Northern Provinces was heavily infected, and there were signs that the disease was spreading rapidly. It then became realized that, when dealing with hundreds of thousands of cases, the cost of surveying the whole area regularly would be prohibitive; once a mass survey has been completed and all cases treated, a field dispensary is established to deal with relapses and fresh infections. Adequate protective measures are essential; anti-tsetse clearing by local communities, and in some instances the removal and concentration of the population, are the only certain methods of controlling the disease.

In 1937, a special Sleeping Sickness Ordinance was enacted to give the necessary legal powers, a scheme for the expansion of the Service was approved, and a grant of £19,000 a year, for five years, was obtained from the Colonial Development Fund to pay for a control service, provided that Nigeria financed the improvement of the treatment service considered necessary.

Details are given of the present state of affairs in the various infected emirates. These must be consulted in the original by those interested. The following are the conclusions :—

"The findings have been given for a series of resurveys in different parts of Northern Nigeria during the last 12 months. Out of 149,820 people examined in all areas, only 2,320 cases were found, an average infection rate of 1·6 per cent. The average rate of the original surveys of the same areas was 9·4 per cent. In only one locality, the Ganawuri villages which were moved to a tsetse-free site, can protective measures have had anything to do with this reduction in the infection rate.

"The establishment of field sleeping sickness dispensaries in the districts which have been surveyed and treated has played a big part in reducing the infection rate and in controlling the disease. In many

localities once the incidence has been diminished by mass treatment, dispensaries can cope with relapsed cases and fresh infections. Attendance at dispensaries has been greatly helped by the propaganda value of the surveys.

"Although the success of this intensive treatment campaign is undoubted there must be no relaxation of effort. At present sleeping sickness is more or less confined to the central parts of the country in the neighbourhood of lines of communication and mining areas. Fortunately, it has not yet spread to the peripheral zones which both in the east and west are heavily infested with tsetse fly.

"There are some infected areas which have not been surveyed yet and there are others where resurveys are urgently needed. Up to 1935, there was evidence that sleeping sickness was still spreading in spite of all efforts, but since then there has been a great improvement. The disease is now much more under control and large scale protective campaigns have been started to consolidate the gains of recent years. It is to be hoped that in a short time, mass treatment will only be required occasionally in a few areas and that communal protective clearings and voluntary treatment at dispensaries will be sufficient to control the disease."

W. Y.

JACK (R. W.). **Annual Report of the Division of Entomology for the Year ended 31st December, 1937.**—*Rhodesia Agric. Jl.* Vol. 35. No. 8. pp. 652–676; also as *Bull. Minist. Agric.* [*S. Rhodesia*] No. 1080. 25 pp. Salisbury, August 1938. [Summarized in *Rev. Applied Entom.* Ser. B. 1939. Feb. Vol. 27. Pt. 2. p. 20.]

"In the course of the medical and veterinary section of this report, J. K. Chorley gives an account of the situations in 1937 in the various localities in Southern Rhodesia in which control measures against *Glossina morsitans*, Westw., were or had been carried out. The history of controlled game destruction and the creation of fly-free buffer zones as a measure for checking the advance of the fly is very briefly reviewed, and it is pointed out that this measure has now passed the experimental stage and can with confidence be applied to any area on the periphery of a fly-belt, wherever land is required for development. The immediate objects of the present policy in the various districts is outlined, but it is also suggested that the fly might be eradicated from all the infested areas in the Colony by judicious and cautious extension of controlled game destruction over a period of years, and that this could be combined with the establishment of game sanctuaries in the areas cleared of fly, so that no extermination of species of game animals would take place. In areas in the low veldt where elephant and rhinoceros are abundant, other measures, such as bush and thicket clearing, might have to be employed; rhinoceros cannot be driven, are very localised and remain for years in the vicinity of a few favoured water-holes. The area to which these measures might be applied lies outside the zone of European settlement and little mining activity is likely to develop. During the year, a further area of 1,500 square miles was reclaimed.

"A number of cases of trypanosomiasis of cattle occurred during the year on farms adjacent to the Melsetter border. As most of these farms were in the basins of the Inyamadzi or Chiredza rivers or were connected by a forest belt with them, further clearing was undertaken at the junction of these two rivers where they cross the border, the clearing being made approximately three-quarters of a mile wider at this point. The original clearing was maintained, all re-growth being slashed back, and grass-burning was successfully carried out in October. A further spread of *G. morsitans* in Portuguese East Africa towards the border was recorded, flies being taken at a point not more than five miles from the border

clearing, so that the threat of invasion at the southern end of the Melsetter district has increased.

"*Amblyomma hebraeum*, Koch, has extended its range northward from Matabeleland to the Gwelo and Hartley district."

LAVIER (G.). La lutte contre les glossines. [**The Combat against Glossina.**]—*Ann. de Méd. et de Pharm. Colon.* 1939. Jan.–Feb.–Mar. Vol. 37. No. 1. pp. 27–40.

A general discussion of measures adopted against tsetse; these must depend on local conditions. By a careful study of these one will avoid errors, failures and loss of time and money. The study involves examination of the terrain, identification of the species of Glossina which infest it, their biology and particularly their association with the vegetation. The entomologist should work in conjunction with the botanist and a forestry officer. The paper continues in this way with generalizations, and must be consulted in the original by those interested. *W. Y.*

MALARIA.

Précis OF ABSTRACTS IN THIS SECTION.

WILSON (p. 676) contrasts the fully immune state of the Digo tribe of Tanganyika Territory, who are constantly infected and show no apparent ill effects in adult life, with the incomplete immunity of the Nyiramba tribe, less exposed to constant infection, the adults of which suffer from attacks during the transmission season. In the former, treatment should be limited so as not to interfere with the acquisition of immunity, since anopheline control is impossible. In the latter treatment and control are indicated. He describes the parasites of *P. falciparum* seen in immune and non-immune persons.

SARIKJAN (p. 677) shows that in Central Russia the majority of primary attacks in infants occur in the first half of the year, probably because a large proportion of cases have long incubation periods.

CORRADETTI (p. 677) states that malaria only occurs in the wet season in the region of Lake Tsana, and that highlands above 2,000 metres are free throughout the year. He recommends prophylactic quinine in the rainy season. CICCHITTO (p. 678) in Italian Somaliland finds *P. falciparum* to be the commonest parasite. Infection with *P. vivax* gives the highest spleen rate and the largest spleens.

In the Bahrein Islands, AFRIDI and MAJID (p. 678) found malaria to be an important disease. *A. stephensi* is probably the only vector but is very prevalent, breeding in drains, pools, wells and seepage pits. All three Plasmodia are found.

FARINAUD *et al.* (p. 679) show that in Saigon-Cholon sporadic outbreaks of malaria occur in what is an area of extremely low endemicity. *A. vagus* is the commonest anopheline and it may be that the enormous proliferation of this comparatively ineffectual vector is responsible for the limited transmission which takes place.

CALLENDER and GENTZKOW (p. 679) attribute the higher incidence of malaria in the United States Army personnel than in the Canal employees in Panama to greater exposure and lack of immunity.

Pinto (p. 680) shows that *A. gambiae*, first found in Brazil in 1930 and transported there from Africa, is now breeding extensively in water of many types. Sporozoite rates as high as 30 per cent. have been found, and epidemics of malaria, with high mortality, caused. Buxton draws attention to the gravity of the position.

Roy *et al.* (p. 681) remark on the prevalence of *A. stephensi* in Calcutta. It is not there a carrier of malaria though in certain other cities it is dangerous.

Sivalingam (p. 681) found higher parasite counts in primary cases of *P. vivax* infection than in relapses or reinfections. Usually in primary cases, high counts were associated with subsequent high temperatures, but this was not so in the others.

Boyd and Kitchen (p. 682) consider that if infected mosquitoes are applied to several patients consecutively, the numbers of sporozoites in their glands progressively diminish. With small numbers (1–5) of mosquitoes there are significant differences in the characters of the infections produced in the first and last patients, the latter having long incubation periods and short attacks. These short attacks therefore may be as significant of inadequate infection as of immunity. They also (p. 682) report an incubation period of 304 days in a patient aged 15 infected with the McCoy strain of *P. vivax*.

Strickland (p. 682) discusses the quinine supplies of India.

Fastovskaia and Chenderowitch (p. 683), after a comparative test of quinine and acriquine, alone or in conjunction with plasmocide, in treatment, consider that the latter is as effective as the former, and suitable for mass treatment. Early relapses were most frequent in *P. falciparum* infections.

Stauss (p. 683) states that the daily dose of plasmoquine now regarded as sufficient is 0·01 gm. per 10 kilos body weight. He discusses the by-effects, abdominal symptoms, methaemoglobinaemia and blood changes. By-effects are rare with atebrin but may follow intravenous injection. The ratio of plasmoquine to atebrin should be not more than 1 to 20, as in Atepe tablets.

Pizzillo (p. 685) reports three patients with recent malaria who required a second course of adrenalin treatment for cure. This treatment represents an exact reproduction of the process of spontaneous recovery.

In the *Bulletin de l'Institut d'Hygiène du Maroc* (p. 686) it is stated that the guiding principles in prophylaxis are standard treatment in epidemics, clinical prophylaxis of children in endemic areas and eradication of the disease in areas of feeble endemicity. The state of premunition governs the dose and rhythm of drugs as prophylactics. Weekly administration is sufficient in Morocco. Simeons (p. 686) obtained excellent results in the eradication of severe endemic malaria by mass treatment by atebrin injections and plasmoquine followed by the treatment of subsequent cases by atebrin injections alone. The relapse rate was very low, unlike the high rate observed in the treatment of sporadic cases elsewhere by atebrin injections and the author considers this to be due to the immunity already developed in the people of the endemic area. Immunological grouping is therefore important in treatment. Work by Winchester (p. 687) on two comparable groups of persons in Georgia, U.S.A., subject to infection with *P. falciparum* has shown considerable reduction in parasite indexes and spleen rate in the group receiving prophylactic atebrin, as compared with the control group.

Tibourskaja (p. 687) found that quinoline No. 31, 0·03 gm. thrice daily administered to gamete carriers of *P. vivax* and *P. falciparum* rendered them incapable of infecting mosquitoes. In *P. vivax* cases the gametostatic effect lasted five days. In *P. falciparum* infections a smaller dose was sufficient. *C. W.*

Hackett (L. W.). Le più recenti ricerche sulla malaria ed alcune loro applicazioni. [**Recent Researches on Malaria and Some of their Applications.**]—*Rendiconti Istituto di Sanitá Pubblica.* Rome. 1938. Vol. 1. Pt. 2. pp. 433–447. With 7 figs. on 3 plates.

An interesting lecture which covers practically the whole field of malaria research. It provides an admirable summary of modern conceptions regarding the epidemiology of the disease.

Norman White.

Wilson (D. Bagster). **Implications of Malarial Endemicity in East Africa.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1939. Jan. 28. Vol. 32. No. 4. pp. 435–446. With 1 fig. [13 refs.] Discussion pp. 447–465. With 1 graph.

The author's averred intention in presenting this paper was to arouse discussion on " the relevance of what has been called ' natural immunity ' to malaria in deciding on an anti-malaria policy." This immunity is defined as a state of acquired resistance to the ill-effects of the presence of malaria parasites, obtained by natural infection, which is probably dependent upon the persistence of parasites in the immune organism. The unorthodox use of the phrase " natural immunity " to describe an acquired condition was unfortunate as it acquired a prominence in the discussion that was hardly justified in view of the clear definition quoted above.

A comparison is made of malaria as it occurs among the Digo of the East African coast, with the malaria observed among the Nyiramba, a Bantu tribe living on a plateau in central Tanganyika. The former is an example of hyperendemic malaria to which full immunity is acquired. The spleen rate, 85 per cent. in children, falls to 39 in adult life with a corresponding fall in the parasite rate ; the average parasite count varied from 7,000 per cmm. in infants to less than 200 in adults. There was a marked seasonal increase in the parasite counts of infants and very young children but none at later ages whatever the intensity of infected anopheline infestation of houses. There were no apparent ill-effects in older children or adults attributable to malaria. It is estimated that among these Digo an individual is likely to receive an infective bite twelve times a year. Anopheline control is economically impossible. Attempts at curative treatment, sufficient to interfere with the acquisition of a solid immunity should be avoided. Treatment in the first year or two of life, pending the acquisition of this immunity, should only be sufficient to save life.

The malaria of the Nyiramba is also hyperendemic but the immunity they acquire is incomplete. The spleen rate of children is 87 per cent., 68 in adults. The parasite rate declined with age but the decline was very small in the wet season. Adults suffer from attacks of malaria during the transmission season. Anopheline breeding is seasonal : Anopheles were found in houses during only eight months. The

estimated number of infected bites an individual receives a year is between 4 and 8. The seasonal nature of infection explains the incomplete immunity acquired. In the case of these people drug treatment or anopheline control, or both, are indicated.

P. falciparum is the predominant species: the author believes immunity to *P. falciparum* to be very evanescent. He describes morphological differences of *P. falciparum* as seen in the blood of immunes and non-immunes respectively. In non-immunes the parasites are almost monomorphic, minute or very minute rings, one to four in a cell, *appliqué* forms common, and stippling of the cell difficult to obtain. In immune persons the parasites are more polymorphic.

It is to be hoped that the author will have ample opportunity of following up several promising lines of inquiry foreshadowed in his paper. *N. W.*

Sarikjan (S. J.). Contribution au problème de la fréquence du paludisme dans la population puérile au moment d'une explosion épidémique dans la région centrale de RSFSR. [**Incidence of Malaria among Child Population in an Epidemic Outbreak in the Central Region of the USSR.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 4. [In Russian pp. 551–558. [19 refs.] French summary p. 558.]

When malaria appears in epidemic form in the central regions of the USSR, children, not excluding infants, suffer most. The majority of primary attacks of malaria in infants occur in the first half of the year, more especially in the second quarter. This is probably attributable to the large proportion of cases with prolonged incubation periods. Cases of primary malaria in infants born in the preceding autumn or winter have shown that infection with malaria is possible not only in the event of the mother suffering from active malaria during pregnancy but also if she is in the period of these prolonged incubations. Moreover, in the winter and early spring primary attacks may be caused by mosquitoes which have been hibernating.

N. W.

Corradetti. Epidémiologie du paludisme dans la région du lac Tsana. [**Epidemiology of Malaria in the Lake Tsana Area.**]—*Bull. Office Internat. d'Hyg. Publique.* 1938. Dec. Vol. 30. No. 12. pp. 2793–2795.

Inquiry carried out at the end of April and the beginning of May failed to reveal the presence of any important anopheline vector of malaria. *A. cinereus* was found as were *praetoriensis*, *transvalensis mauritianus* and larvae resembling *longipalpis*. The author concludes that in the parts of Gondar visited malaria does not occur in the dry season. Areas above 2,000 metres are free from malaria throughout the year; at lower levels malaria can occur during and after the rains; further observations are called for in the rainy season. He recommends prophylactic quinine 0·60 gm. on three consecutive days each week from June to October inclusive in areas below 1,600–1,700 metres. In areas about 1,800 metres similar doses of quinine should be taken from the middle of August to the end of October. *N. W.*

Cicchitto (Angelo M.). Ricerche sugl'indici malarici-splenico e parassitario—nella Somalia Italiana. [**Parasite and Spleen Indexes in Italian Somaliland.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 5. pp. 396–410. [13 refs.] French summary.

The author bases his study on malaria patients treated in the hospitals of Mogadisco during four years 1934–37. The patients came from most parts of the colony. *P. falciparum* was most in evidence, 60–65 per cent. of cases ; *vivax* 30–35 per cent. ; *malariae* 5–8 per cent. The percentage of parasite carriers among those with enlarged spleens was almost identical with the percentage of enlarged spleens among parasite carriers. Enlargement of the spleen was most frequent in *vivax* infections and the degree of enlargement was greatest. Very large spleens were rare in *falciparum* infections. The spleen rate was lowest in *malariae* infections though very large spleens were more common than in *falciparum* infections. *N. W.*

Afridi (M. K.) & Majid (Syed Abdul). **Malaria in Bahrein Islands (Persian Gulf).**—*Jl. Malaria Inst. of India.* 1938. Dec. Vol. 1. No. 4. pp. 427–472. With 3 maps & 1 chart. [14 refs.]

This, the first published malaria survey of the Bahrein Islands, was carried out during a fortnight in January and five weeks in the following May and June. The inquiry was confined to the main Island of Bahrein and the adjacent islet Muharrak. Two considerable towns, Manama, population 40,000 to 50,000, and Muharrak, population 30,000 to 40,000, were included in the survey. The hot humid climate is characteristic of the Persian Gulf. The average annual rainfall is but 3¼ inches and there are only from 3 to 6 rainy days a year. The main island is 30 miles in length and has an area of 108 square miles. Cultivation is confined to narrow belts of date palm plantations. Here there are copious springs of warm and slightly brackish water. The total population of the archipelago is estimated at 150,000. Pearl fishing is the important industry ; recently oil fields have been discovered.

There are no morbidity nor other vital statistics available. It appears, however, that malaria has always been an important cause of sickness. Malaria is responsible for nearly a quarter of the cases treated at the Manama Hospital. The spleen rate for 234 children between 4 and 14 years of age in Manama was 38·9 ; the corresponding rate for Muharrak town was 13·1. The parasite indexes for these towns were 21·8 and 6·3. The anophelines identified were *stephensi*, *fluviatilis*, *culicifacies*, *pulcherrimus*, and *sergenti*. *A. stephensi* was much the most prevalent and the only species found infected. It is probably the only vector. It was found breeding in agricultural drains, leakage pools, shallow domestic wells and garden pits containing seepage water. In some disused irrigation wells and garden pits increase in the salinity of the water precluded the breeding of *A. stephensi*. In the 34 positive blood films, among the 249 examined in January, the species of parasite found were :—*falciparum* 10, *vivax* 13, *malariae* 10, and *falciparum* with *malariae* 1.

This interesting and well documented report concludes with a series of recommendations concerning the temporary and permanent control of malaria in Bahrein. *N. W.*

Farinaud (E.), Ramijean (R.) & Favot (M.). Nouvelles recherches sur le paludisme à Saigon. [**New Investigation of Malaria in Saigon.**]—*Rev. Méd. Française d'Extrême-Orient.* 1938. Aug–Sept. Vol. 20. No. 7. pp. 878–888. With 1 folding plan.

Localized outbreaks of malaria occur in Saigon-Cholon from time to time. There has, however, been considerable discussion as to whether indigenous malaria occurs in Saigon at all. The two contiguous towns of Saigon and Cholon, now united, have a population of about 360,000, unevenly distributed over an area of 55 square kilometres. The European and commercial parts of the town are well constructed, but towards the fringe of the urban area native huts are scattered or grouped in what are, for all practical purposes, villages separated by varying distances one from the other. In these outlying parts of the town swamps and marshes, communicating with the network of channels and canals that surround the town, are a prominent feature.

During the three last months of the year 15,000 children from 2 to 12 years of age, in all parts of the town, were examined. The estimated child population, of these ages, of the town is 77,000. The spleen rate was 1·36 per cent., varying in the 18 different quarters of the town from 0·15 to 3·66. The parasite index was 2·92 per cent., varying from 1·22 to 11·42. Nearly all the enlargements of the spleen observed were very small. The quarters of the town most infected are all on the outskirts near water channels or inundated land. In the maternity hospital the percentage of cases in which child-bearing was complicated by an attack of malaria was 4·32 in 1937 and 3 during the first six months of 1938.

There are undoubted foci of malaria infection in Saigon-Cholon but the low endemic indexes indicate seasonal or sporadic outbreaks occurring in an area of extremely low endemicity.

The species of *Anopheles* found are *barbirostris*, *sinensis*, *vagus*, *philippinensis*, *kochi* and *tessellatus*. *A. vagus* is much the most frequent, representing almost the totality of adults captured. No important vector of malaria occurs in any numbers and the hypothesis is put forward that perhaps the enormous proliferation of such an ineffectual vector as *A. vagus* may be responsible for the limited transmission that does occur.

In spite of the little importance of malaria the authors urge the importance of filling marshes and inundated land within town limits.

N. W.

Callender (G. R.) & Gentzkow (C. J.). **Malaria in the Panama Canal Department United States Army. I. Incidence of Primary Cases in 1936 and 1937.**—Reprinted from *Milit. Surgeon.* 1938. Oct. Vol. 83. No. 4. pp. 299–316. With 3 figs. [13 refs.]

The incidence of malaria in the United States Army in Panama is more than thrice as high as that among employees of the Panama Canal. Among the reasons for this higher incidence are the closer proximity to anopheline breeding places of certain army posts; exposure at subposts, most of which are in unsanitated areas and some of them unscreened, and exposure during military operations in unsanitated areas. The Canal Zone employees are both coloured and white. The former have an immunity to *P. vivax*. Old residents have frequent recourse to quinine. In 1935 and 1936 *P. falciparum*

was responsible for 76 per cent. of the total cases of malaria among the coloured employees but only 30 per cent. among the white. In soldiers in 1936 *falciparum* was responsible for 41·7 per cent. of primary cases and 12 per cent. of relapses. Military personnel on arrival have no immunity: their tour of service in the Zone is from two to three years.

Among the soldiers there was no real decrease of primary malaria incidence in the ten years 1927–36, the annual rates fluctuating between 31·89 in 1932 and 65·84 in 1933, per 1,000 of strength. The incidence of malaria contracted in posts and subposts in 1937 was somewhat less than in the previous year, an improvement that is attributed to more efficient screening, efforts at preventing mosquitoes entering buildings, and the more intensive use of insecticide. *N. W.*

Gasic (Gabriel). Indice esplenico en el Valle de Azapa. (Comunicación preliminar.) [**The Spleen Index in the Azapa Valley.**]—*Rev. Chilena de Hig. y Med. Preventiva.* 1938. July–Sept. Vol. 1. No. 7–9. pp. 393–396.

Collignon (E.). La campagne antipaludique de 1937 dans le département d'Alger.—*Arch. Inst. Pasteur d'Algérie.* 1938. Sept. Vol. 16. No. 3. pp. 323–337. With 8 figs. on 4 plates & 2 diagrams.

Ambialet (R.). La campagne antipaludique de 1937 dans le département de Constantine.—*Ibid.* pp. 338–350. With 2 text figs. & 6 figs. on 3 plates.

Gouget (R.). La campagne antipaludique de 1937 dans le département d'Oran. [**The Anti-Malaria Campaign of 1937 in Algiers, Constantine and Oran.**]—*Ibid.* pp. 351–359. With 3 text figs. & 8 figs. on 4 plates.

Gillet (R.). Etude épidémiologique du paludisme à El Goléa en 1937. [**Epidemiological Study of Malaria in El Goléa in 1937.**]—*Ibid.* pp. 360–381. With 1 map & 4 plates.

Pinto (G. de Souza). L'invasion du Brésil par l'*Anopheles gambiae* et ses conséquences. [**The Invasion of Brazil by *Anopheles gambiae*, and the Sequel.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 6. pp. 475–480.

In March 1930, Shannon discovered *Anopheles gambiae*, the great carrier of malaria in Africa, breeding at Natal in Eastern Brazil [this *Bulletin*, 1932, Vol. 29, p. 834]. It was clear that the insect had been transported across the Atlantic and had recently established itself.

The present paper tells us that any misgivings that may have been felt have been fully justified. The insect is breeding in water of many types, and spreading. Sporozoite rates as high as 30 per cent. have been found more than once, and very widespread epidemics of malaria have been caused, accompanied by a high death rate, the case mortality being 6 to 15 per cent. In the author's view, insects probably came across as adults in the weekly boat from Dakar, West Africa: aeroplanes are fewer and are less likely to have carried the insects, though it is scarcely correct to say that an aeroplane would offer no opportunity of travel to a mosquito.

[The event is very grave, the invasion of tropical America by the world's most versatile and dangerous carrier of malaria. This outbreak still lacks a historian, though it may be the gravest insect-borne epidemic of history. The present paper is disappointing, for it

gives no information about the previous prevalence of malaria in the area invaded, or about to be invaded : it gives no information about the insect's rate of spreading, or whether it is advancing by road and rail, or across the countryside : it tells nothing of the area now covered, or the population now exposed to risk : it does not discuss the measures undertaken or planned for dealing with the situation.] *P. A. Buxton.*

Roy (D. N.), Chandra (S. N.) & Siddons (L. B.). **On the Presence of a Zoophilic Race of** *A. stephensi* **in Calcutta.**—*Jl. Malaria Inst. of India.* 1938. Dec. Vol. 1. No. 4. pp. 417–426. [22 refs.]

The history of malaria in Calcutta is full of puzzles and anomalies. The authors of the present paper call attention once again to the abundance of *Anopheles stephensi* in the city, and to the fact that it is not a carrier of malaria, though it is so dangerous in certain other cities in India. They have carried out successful precipitin tests on 115 individuals, captured in Calcutta : only four of these contained human blood, the remainder being positive for cow or buffalo. [One would gladly see a much larger collection of figures taken from different parts of the city and throughout the year.]

P. A. Buxton.

Hoffmann (Carlos C.). La formación de razas en los anopheles mexicanos. II. *Anopheles albimanus* y sus variedades en la República Mexicana. [**Races of Mexican Anopheles.** *A. albimanus* **and its Varieties.**]—*An. Inst. Biol.* Mexico. 1938. Mar. & June. Vol. 9. Nos. 1 & 2. pp. 167–180. With 7 figs. [12 refs.] German summary.

Del Vecchio (Gaetano). Sugli anofelini esistenti in provincia di Littoria. Nota Preventiva. [**The Anophelines of the Province of Littoria.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 6. pp. 425–430. English summary (8 lines).

Zon (B. K.). Zoutwatervischvijvers en malaria. [**Salt Water Fish Ponds and Malaria.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Feb. 28. Vol. 79. No. 9. pp. 529–540. [14 refs.]

Sivalingam (V.). **Enumerative Studies in Benign Tertian Malaria.**—*Indian Med. Gaz.* 1938. Dec. Vol. 73. No. 12. pp. 715–720. [11 refs.]

Parasites were enumerated in 50 cases of *P. vivax* malaria. Of these cases 22 were primary, the remainder being " subsequent " cases, the author's designation for relapses and reinfections. The observations were made in a district of Ceylon which was free from malaria prior to the epidemic of 1934-35. Sinton's method of enumeration was used. Blood smears were made a few hours before an anticipated paroxysm. Parasite counts were higher in primary cases. Thirteen of the 22 primary cases had counts of over 10,000 per cmm., as compared with 8 of the 28 relapses and reinfections. In primary cases high counts were associated with subsequent high temperatures, but there were exceptions. No such relation between parasite count and degree of fever appeared to exist in " subsequent " cases. The author concludes that about 900 parasites per cmm. are necessary to produce fever in primary attacks : about 500 are sufficient in subsequent attacks.

N. W.

Boyd (Mark F.) & Kitchen (S. F.). **The Clinical Reaction in Vivax Malaria as influenced by the Consecutive Employment of Infectious Mosquitoes.**—*Amer. Jl. Trop. Med.* 1938. Nov. Vol. 18. No. 6. pp. 723–728.

In carrying out immunity observations mosquitoes destined for application on the test case were previously and subsequently applied to patients considered wholly susceptible. Intervals of three or four days elapsed between successive applications of any given lot of mosquitoes. Data concerning 116 inoculations done in this manner are considered in the present report. It is inferred that if mosquitoes be applied to several subjects consecutively the number of sporozoites in their glands will gradually be depleted. There is, moreover, a certain mortality in lots of mosquitoes thus treated which reduces the number of sporozoites inoculated in the later patients. Results obtained with lots consisting of 1–5 and 6–10 mosquitoes are compared. With the smaller number of mosquitoes there are significant differences in the character of the infection experienced by the first and last patient of a series. Patients infected in the last application tend to have longer incubation periods and shorter attacks. These differences are not observed if many mosquitoes are employed. The duration of the clinical attack following inoculation by a moderate number of infected mosquitoes tends to vary inversely with the duration of the incubation period. Attacks of less than eight days duration may be as significant of inadequate inoculation as of immunity. *N. W.*

Boyd (Mark F.) & Kitchen (S. F.). **An Instance of Protracted Latent Incubation Period in a Patient infected with a North American Strain of** *Plasmodium vivax*.—*Amer. Jl. Trop. Med.* 1938. Nov. Vol. 18. No. 6. pp. 729–731.

A patient aged 15 was bitten by 12 *A. quadrimaculatus*, infected with the McCoy strain of *P. vivax* on 21st June ; 10 of these mosquitoes were re-applied to the patient four days later. The re-application was prompted by the light quantitative incidence of infection in this lot of mosquitoes. The inoculation was regarded as a failure ; the patient was returned to the general wards of the hospital but smears of his blood were taken at weekly intervals. On 21st April, 304 days after the first application of mosquitoes, the patient had a chill and *P. vivax* was found in the blood. The attack lasted 24 days and terminated spontaneously. The patient had been housed in a screened ward ; there had been no autochthonous case of malaria in the hospital during the previous two months. Inoculation experiments indicated the probability, almost certainty, that infection was due to the McCoy strain. *N. W.*

Strickland (C. F.). **Quinine and Malaria in India. Indian Village Welfare Association.**—19 pp. 1939. London : Humphrey Milford, Oxford University Press. [6*d.*]

This pamphlet is apparently designed to instruct, or to create public opinion regarding the supply of, and demand for, quinine, the need for increased consumption of quinine in India, and the desirability of making India eventually self-sufficient with regard to cinchona cultivation and quinine manufacture. The present position with regard to these matters is described and a policy is advocated. The

policy is the creation of a government monopoly; a quinine control board would receive all quinine manufactured in or imported into India; quinine would be sold at a fixed price to shopkeepers and at a fixed price by them to the public. For free distribution to necessitous persons, cinchona febrifuge would be used. There would be no free distribution of quinine. Meanwhile the quinine control board would push forward schemes for increased production. The difficulties, cost and advantages of such a scheme are discussed as is the necessity for international agreement. An informing pamphlet for the uninitiated.

N. W.

Fastovskaia (E.) & Chenderowitch (R.). Données comparées sur le traitement de la malaria par la quinine et les produits synthétiques soviétiques antipaludéens, d'après le schéma établi par la commission du paludisme au comité d'hygiène de la Ligue des Nations. [**Comparative Results of Treatment of Malaria with Quinine and Sovietic Synthetic Remedies in accordance with the Scheme of the Malaria Commission of the Health Committee of the League of Nations.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 3. [In Russian pp. 299–334. With 2 figs. French summary p. 335.]

An isolated village, Pokrovoskoie, in a swampy area, with a stable population suffering from endemic malaria, was selected for experiment. *P. vivax* and *P. falciparum* cases are equally prevalent, the former being most prevalent in May, the latter in September. The village was divided into four districts in which malaria cases were treated in accordance with one of the four following methods:—(1) Quinine 0·5 gm. twice a day for seven days. (2) Acriquine 0·15 gm. twice a day for seven days. (3) Quinine 0·5 gm. twice a day for seven days followed after a three days' interval by plasmocide 0·03 gm. twice a day for five days. (4) Acriquine 0·15 gm. twice a day for seven days followed after a three days interval by plasmocide 0·03 gm. twice a day for five days. The complete treatment according to one or other of these methods was given to 1,485 patients. On the whole, acriquine gave better results than did quinine. The percentages of relapses with methods 2 and 4 were 40·2 and 37·0 respectively. Quinine, methods 1 and 3, had relapse rates of 44·6 and 44·4 per cent. respectively. Half the relapses occurred within 45 days of the termination of treatment. These early relapses were most frequent in *falciparum* infections. The authors conclude that Sovietic synthetic remedies are in every way as effective as quinine and that in the doses used they can be recommended for mass treatment. *N. W.*

Stauss (Hermann). Die klinischen Nebenwirkungen des Plasmochins und des Atebrins. [**Clinical By-effects in the Use of Plasmoquine and Atebrin.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Jan. & Feb. Vol. 43. Nos. 1 & 2. pp. 19–32; 55–73. [118 refs.]

Harmless by-effects, which often follow the use of plasmoquine, as well as the more serious, which are rare, have been reviewed by the author from the literature. He notes that malaria, like syphilis, gives rise to many symptoms apart from drugs and these must be considered. Complications such as amoebic dysentery and hookworm infections affect the blood picture markedly. Those symptoms which arise during administration of plasmoquine depend largely on dosage as

well as on individual and race. In the early days the dose given was much too large. That now recommended is 0·01 gram per ten kilo. body weight per day. Stomach-ache, nausea, vomiting, diarrhoea, tenesmus, loss of appetite, are some of the symptoms complained of. Other possible causes for these are discussed. Plasmoquine plus atebrin is not so well borne as either alone. If the ratio of plasmoquine to atebrin is not above 1 : 20, as in atepe tablets, fewer complaints are recorded.

Other factors discussed regarding by-effects are food, race, type of infection, condition of the patient and gastric hydrochloric acid content. It is better to start plasmoquine treatment some days after the atebrin course is completed. During plasmoquine treatment a slight transitory albuminuria may arise, with no permanent kidney damage. Malaria cases with albuminuria are said to benefit from plasmoquine. The cyanosis produced in some patients results from intracellular methaemoglobin formation. Pulse and respiration are not affected and the characters of an anaemia are absent. Blood vessels may contract or dilate accordingly as the drug content is low or high. The amount of methaemoglobin formed is not proportional to the dose of drug, but time and length of its appearance depend on dose to some extent. Ambulant cases treated with the drug rarely exhibited the sign, and its appearance does not call for discontinuation of treatment. Haemoglobinuria has rarely been noted following the use of the drug, and according to one author methaemoglobin is chiefly present, whereas with B.W.F. haemolysis and oxyhaemoglobinuria are characteristic. In therapeutic doses plasmoquine is not haemolytic. Liver damage may arise from the drug or the disease.

Regarding the blood picture, the appearance of punctate basophilia, increase of lymphocytes, changes in polynuclears and cosinophils seem to be inconstant, as well as the appearance of certain pathological white cell elements. Pulse arrhythmia during treatment was early described but is not generally noted, and blood pressure is not affected. In animals excessive dosage caused liver and other damage but electrocardiograms showed no abnormality till death approached. Transitory oedema of face and limbs, also seen in untreated malaria, has been noted. If given parenterally the intramuscular route should be used. It is claimed that all circulatory symptoms recorded during treatment with the drug can be seen in untreated malaria.

Atebrin is given as the bi-hydrochloride by mouth. The soluble dimethanesulphonate is used for injection. It often causes swelling at the site but abscesses are rare. The dose is $3 \times 0{\cdot}1$ gm. daily for five days. Children take the drug well. As a prophylactic 0·4 gm. per week is taken. Decomposition occurs in aqueous solutions, and such should not be left more than twelve hours before use. The drug is partly decomposed in the body.

Alimentary canal symptoms are rare. Constipation and colicky pains have been described. In animals excessive doses may cause diarrhoea. In cases in which excretion was slow colicky pains have been reported. Aspirin, hot packs or opium are recommended for treatment. Other causes for the pains are discussed.

Albuminuria is not caused by atebrin and according to some nephritis and nephroses do not contraindicate its use. The heart muscle as well as systolic and diastolic blood pressure remain unaffected except as noted with excessive doses in animals. The same is true of pulse and respiration and patients with endo- or myocarditis may take the drug, according to some authors.

By the intramuscular route absorption is rapid and intravenous dosage is never called for except in comatose or BWF cases. Weakness, giddiness, cramps and collapse may follow intravenous administration. The drug does not cause haemolysis either *in vivo* or *in vitro*, nor does it form methaemoglobin. The changes in the white cell picture described vary with different authors. In so far as it does not affect the heat regulating centre, atebrin is not an antipyretic. Being a dye it is absorbed by the tissues and a higher dose may be required at the start to give the full therapeutic effect. Pyschic and neurological symptoms are described by KINGSBURY during malaria treatment with the drug. The present author discusses his views.

The yellow coloration of varying intensity, which may appear in the skin of a patient, from the fourth day of treatment till eight days after its cessation may last, as seen in one case, for 69 days. It is due to impregnation of the skin with the drug and has no relation to icterus. The conjunctivae generally escape and there are no records of vision being affected. Atebrin may even be given if icterus is present. Whether the drug can be re-absorbed from the skin and give rise to therapeutic effect is not known. Bilirubin does not appear in the urine following use of the drug. The diagnosis of atebrin coloration is given, as well as the views of different authors on drug accumulation, which is affected by many factors. It is of interest that distribution of the drug in tissues of generative organs does not affect reproduction. Some other diseases in which the above two drugs are useful have been described.

The last part of the article is devoted to an attempt to demonstrate the advantage of these two synthetic agents over quinine, as regards accompanying by-effects. The author adduces in favour of the value of these two compounds the fact that similar types have been made in France and Russia. *J. D. Fulton.*

PIZZILLO (Giuseppe). Sulla cura adrenalinica venosa nelle infezioni malariche. Nota XII. Possibilità di un trattamento ripetuto. [**Intravenous Adrenalin Treatment of Malaria : Possibilities of Repeated Treatment.**]—*Riv. di Malariologia.* Sez. I. 1938. Vol. 17. No. 5. pp. 386–395. With 9 graphs. German summary.

This is a report of three cases of malaria, two *vivax* and one *falciparum* infection, all of comparatively recent date, which were treated by Ascoli's method. The immediate results of the treatment appeared satisfactory but the disease was not eradicated. Fever returned and a second course of adrenalin injections was administered to each. The intervals between the courses of treatment were 43, 32 and 93 days respectively. After the second course of treatment all three patients regained complete health. All three cases illustrate the author's previous observation that the reactivation of the malaria parasite in a subject who has been adrenalinized is attended with minimum deterioration of the patient's general condition and without renewed enlargement of the spleen. In the majority of cases the standard treatment of 30 injections is sufficient to produce a cure but that there are exceptions the three cases reported are evidence. The author considers that the treatment represents an exact reproduction of the spontaneous recovery from the disease : it is not surprising, therefore, that the intensity of treatment should have to be increased in certain

cases. Before deciding that the treatment has failed in any given case the advisability of repeating the course should be considered.

N. W.

Bulletin de l'Institut d'Hygiène du Maroc. 1938. Jan.–June. No. 1–2. pp. 109–133. With 1 chart.—Extrait du rapport annuel sur l'activité du service antipaludique en 1937. [**Extract of Annual Report on Activity of Anti-Malaria Service in 1937.**]

Malaria work in French Morocco is now concentrated in the charge of an Anti-Malaria Service the Chief of which is directly responsible to the Director of Public Health. The Service has facilities for research and teaching at its administrative headquarters and anti-malaria stations in most parts of the Territory.

The year 1937, with which this report is concerned, had a rainfall well below normal, almost everywhere. As a result malaria was nowhere unduly prevalent. There were no severe epidemic outbreaks and pernicious attacks were not in evidence. Antilarval measures produced excellent results.

Guiding principles that have been adopted in the prophylaxis of malaria include :—Standard treatment of cases of malaria in the presence of an epidemic : clinical prophylaxis of children and sufferers in endemic areas ; and the eradication of the disease in areas of feeble endemicity in which such measures are justified. The dose and rhythm of administration of drugs used as clinical prophylactics in endemic areas vary according to circumstances, the most important of which is perhaps the state of premunition of the population. There are three methods of estimating the state of premunition :—the splenometric index (the least reliable) ; the relation between the parasite index of adults and the parasite index of children ; and the serological index. In practice two situations may arise. If the population living in a moderate or severe endemic zone is premunized, it is sufficient to treat the children and patients who present themselves for treatment. The spacing of the administration of the drug used, every 8, 10 or 15 days, is determined by the intensity of the anophelism and the rate of gamete carriers. In the case of a population, not, or insufficiently, premunized, that is threatened by excessive prevalence of anophelines, the drug should be distributed to the whole of the population, the rhythm of the distribution being determined as in the preceding case. Experience in Morocco has shown that the weekly administration of drugs is sufficient in all circumstances arising in that country, and that their administration twice a month is insufficient whenever anopheline prevalence reaches a very high level. *N. W.*

Simeons (A. T. W.). **Follow-Up of a Mass Treatment with Injectable Atebrin.**—*Indian Med. Gaz.* 1938. Dec. Vol. 73. No. 12. pp. 713–715. With 1 chart.

The author previously reported the treatment of 5,600 persons at the Godak Mills in the Southern Deccan with two injections, on consecutive days, of 0·3 gm. of atebrin, followed by plasmoquine 0·01 gm. a day for three days. The relapse rate for the six following months was very low. [See this *Bulletin*, 1936, Vol. 33, p. 797.] The subsequent malaria history of this community is reported in the present paper. Every effort has been made to ensure that all fever

cases are promptly reported to the doctor. Every new case of malaria was treated with two injections of atebrin. No plasmoquine was given, nor any quinine. Oiling of pools in the river-bed during the dry season was done. The chart produced gives the monthly incidence of malaria for 2½ years before and 2½ years after the mass treatment with atebrin injections. It illustrates a diminution almost amounting to eradication of severe endemic malaria. These results are at striking variance with the author's experience in treating, elsewhere, sporadic first or fresh infections with atebrin injections : in the latter the relapse rate was almost 100 per cent. within one to six weeks. Oral administration of the drug gave better results in these cases. The author's explanation of his observations is that the injection of a powerful parasiticide, in a primary infection, reduces the parasite count so suddenly that the body is no longer called upon to produce immunity : consequently an unchecked multiplication of residual parasites soon recommences. In a highly endemic malaria region a high degree of immunity already exists. It follows that an immunological grouping of cases is important in treatment. *N. W.*

WINCHESTER (M. E.). **Atabrine Prophylaxis in Malaria. Report of Third Year's Investigation.**—*Amer. Jl. Trop. Med.* 1938. Nov. Vol. 18. No. 6. pp. 625–639. With 4 figs. [17 refs.]

After reference to results obtained by several contributors to malaria literature by the use of atebrin as a prophylactic, the author describes his experience in Harris Neck, McIntosh County in south-east Georgia. This low-lying coastal area contains abundant breeding places for *A. quadrimaculatus*. In 1935 all persons harbouring parasites among a Negro population of 244 were given a five-day course of atebrin. Thereafter the population was divided into two groups of comparable age distribution. The prophylactic group received 50 mgm. of atebrin a day from May 15th to the end of October. The control group received no medication after the initial treatment. This procedure was continued in the two following years, both groups being enlarged. The parasite indexes of the control group and prophylactic group in the spring of 1935 were 7·8 and 9·3 : in the autumn of 1937 they were zero and 16·3 respectively. During the same period the spleen index of the prophylactic group fell from 46·1 to 9·3 and of the control group from 31·8 to 16·9. All infections were *falciparum*. The reduction of malaria was not attributable to meteorological conditions. The encouraging results have decided the author to continue the work. No toxic symptoms attributable to atebrin were encountered, though some individuals during the three years received as much as 25 gm. of the drug. *N. W.*

TIBOURSKAJA (N. A.). La quinoline No. 31 comme médicament gamotrope. [**Action of Quinoline No. 31 on Gametocytes.**]—*Med. Parasit. & Parasitic Dis.* Moscow. 1938. Vol. 7. No. 4. [In Russian pp. 541–549. With 6 figs. French summary pp. 549–550.]

The object of the investigation recorded in this paper was to determine the minimum daily dose of quinoline No. 31 necessary to eliminate the infectivity of gamete carriers for mosquitoes and the duration of this effect. The gametocytes of suitable patients were

counted. The patients were then bitten by large numbers of mosquitoes; subsequent dissection revealed the percentage of these mosquitoes infected. The patients were then treated with quinoline No. 31, 0·03 gm. either thrice, twice or once a day. Twenty-four hours after the last dose mosquitoes were again fed on the patients and subsequently dissected. In *vivax* infections 0·03 gm. thrice daily eliminated subsequent infection of mosquitoes: twice daily this dose prevented the subsequent infection of mosquitoes in 8 cases out of nine. In the ninth case two mosquitoes had each two oöcysts, out of 44 dissected, as compared with 13 infected of 22 before the administration of the drug. With a single dose a day infection was suppressed in two cases and more than halved in a third.

In three *falciparum* cases daily doses of 0·09, 0·06 and 0·03 gm., respectively, produced a complete gamostatic effect.

The duration of the gamostatic effect in *vivax* infections following 0·03 gm. thrice daily is 5 days. *N. W.*

Parrot (L.), Catanei (A.) & Ambialet (R.), with the collaboration of J. Clastrier. Essai comparatif de prophylaxie collective du paludisme par la quinine et par les médicaments synthétiques (quinacrine et praequine) (Algérie, mars 1935–juin 1936). [**Comparative Study of Prophylaxis of Malaria with Quinine and Synthetic Drugs.**] —*Arch. Inst. Pasteur d'Algérie.* 1937. Dec. Vol. 15. No. 4. pp. 450–626. With 24 plates, 32 diagrams, 1 fig. & 1 plan.

Henry (A. F. X.). Sur quelques notions importantes concernant la seroflocculation palustre. [**Seroflocculation in Malaria.**]—*Arch. Inst. Prophylactique.* 1938. Oct.–Dec. Vol. 10. No. 4. pp. 290–301.

LEPROSY.

Précis of Abstracts in this Section.

Morales Muñoz *et al.* (p. 690) report on leprosy in Colombia. Epidemiological and clinical information is given of 466 lepers in an institution, of whom 41 per cent. of males and 64 per cent. of females give a family history of the disease. Most of them came from a well known endemic focus.

Cremer (p. 690) shows that all reflexes may be affected in the neural forms and changes correspond roughly with the extent and severity of the disease. Changed reflexes do not return to normal after clinical cure.

Acanfora (p. 691) reports that the Rubino reaction of the sedimentation of formolized sheep red cells in the serum of the patient is to a considerable extent specific for leprosy, and suggests a modification in which known negative serum is used as a control.

Fernandez (p. 692) using leprolin subcutaneously found that it provoked general, local and focal reactions in tuberculoid leprosy; no reaction in the lepromatous form; and only local reactions in several non-leprous conditions.

Hasseltine (p. 692) reporting on the National Leprosarium, Carville, states that benzocaine-chaulmoogra oil and hydnocarpate esters form the basis of treatment.

DA SILVA (p. 692) uses 30 per cent. chaulmoogra in olive oil, or trichloracetic acid for lesions of the upper respiratory tract, with the galvano-cautery for definite lepromata. VIGNE *et al* (p. 693) show that treatment with a nitrated chaulmoogra oil and novarsenobenzol produced improvement in a leper with positive Wassermann. TISSEUIL (p. 693) advocates the intradermal injection of the oils or esters of chaulmoogra and Gorli seeds in tuberculoid lesions. TISSEUIL and RIVOALEN (p. 693) report good results from the use of Gorli preparations, but the unsaponifiable fractions were inactive. TISSEUIL and GUILHAUMOU (p. 694) failed to obtain beneficial results from intradermal injections of preparations of castor and cod liver oil and methylene blue. VELDS (p. 694) found phenol red to be useless.

RADNA (p. 694) reports favourably on treatment by Loewenstein's vaccine combined with alepol or graumanyl. MALAIHOLLO (p. 694) shows that certain beneficial results occurred in patients treated for two months with intramuscular injections of serum from a sheep which had received injections of bouillon cultures of two strains of acid-fast bacilli isolated from lepers.

MARIE-SUZANNE (p. 695) states that there is a source of calophyllum oil in Indo-China.

FÉRON (p. 695) claims very good results in macular and nodular cases by the use of a copper compound "zymbil-cuivre."

VISHNEVSKY (p. 695) uses blockage of the sympathetic system or circular blockage of nerves of the extremities by novocain in the treatment of leprous lesions and ulcers. This method is based on the beneficial influence of anaesthetics on inflammatory processes.

CHOWHAN and CHOPRA (p. 695) advocate the use of cobra venom and the vitamin B complex in nerve leprosy. VILLELA (p. 696) advocates vitamin B_1 for the pains of nerve leprosy. Vitamins B_1 and C may aid the action of chaulmoogra.

GATTI and GAONA (p. 696) and UGARRIZA (p. 696) used cebion in addition to chaulmoogra with success in cases with septicaemia and abscesses.

General improvement and healing of ulcers took place in 15 patients treated by CLERCKX (p. 696) by diethylamine chaulmoograte.

KHAN (p. 696) obtained good results in the treatment of trophic ulcers by removing dead bone and affording rest and protection by plaster of Paris. MAYNARD (p. 697) also removes dead bone and uses a warmed mixture of beef suet, ghee and beeswax as a dressing. Of 60 cases, 50 healed within six months.

DE BRAUWERE (p. 697) describes treatment in the Congo. KEIL (p. 697) discusses heredity in leprosy.

In rats reinoculated with the bacillus of Stéfansky, BURNET (p. 698) found no reaction similar to that of the Koch phenomenon in tuberculosis, but in mice some increased sensitivity was observed. Reinoculation stimulates phagocytosis in mice, but only feebly in rats. MARCHOUX and CHORINE (p. 698) similarly failed to produce a Koch phenomenon in rats and conclude that in human leprosy superinfection may occur.

PRUDHOMME (p. 698) has preserved the virulence of Stéfansky's bacillus in Sauton's medium in which *Myco. phlei* was growing, at *p*H 6·5. GAVRILOV *et al.* (p. 698) have grown the bacillus on Denys's medium and on potato but the maintenance of pathogenicity was difficult.

Lyon (p. 699) shows that the leprolin reaction is not obtainable in rats. *C. W.*

Morales Muñoz (Tomás), Bernal Londoño (Mario) & de Souza Araújo (H. C.). La lepra en Colombia. Encuestas epidemiologicas. [**Leprosy in Colombia. Epidemiology.**]—*Rev. Colombiana de Leprologia*. Bogota. 1939. Mar. Vol. 1. No. 1. pp. 6–35. With 8 figs.

The figures given in this article are based on a study of 959 persons in the Caño de Loro lazaretto, of whom 466 are segregated lepers, 48 are children of those living there, 62 are women living with the others, but apparently healthy, and 383 persons living in the environs (en la puerta) of the lazaretto in the neutral zone.

Of the 466 lepers, 328, or 70·3 per cent., are half-castes, 78 black and 57 white, or 16·7 and 12·2 per cent., respectively; their nationalities are tabulated and the districts from which they came. Of the total, 355 are males and 146 of these (41 per cent.) give a history of the disease in father, mother, or near relative; of 111 females, 71 (64 per cent.) have such a history. The types of the disease are stated in a list giving them under fifteen subdivisions. Other information includes the previous occupations of the inmates (50 per cent. having worked on the land), the length of residence, duration of the disease, etc.

Forty-eight children of lepers were examined, 35 having been born in the lazaretto; of these there were 25 boys and 23 girls, up to 13 years of age. Four girls, 8–12 years of age, show definite signs of leprosy and five other children—three boys of 6, 7 and 13 years, and two girls of 8 months and 9 years respectively—show suspicious signs.

The chief points of this interesting study may be summed up as follows:—

1. Of the 466 examined, 85·4 per cent. are over 20 years of age, and 95·7 per cent. are from the well-known endemic foci of Bolívar, Atlántico and Magdalena.

2. Forty-one per cent. of males and 64 per cent. of females give a family history of the disease.

3. Sixty per cent. belong to the clinical types L2 and L3 and some have been segregated for more than 10 years without showing improvement; 94 per cent. have had the disease for four years or more.

4. About one-third, 32·4 per cent., have purely cutaneous or nervous lesions.

5. Of 383 living outside the leprosarium, of whom 51 per cent. were adults, 1 woman has a perforating ulcer of the foot, 1 girl shows a suspicious macule on the face and 2 children (girls) show suspicious symptoms.

[This is the first number of a new periodical devoted to leprosy, and if the standard presented in this issue is maintained, the information should prove of much value to leprologists.] *H. H. S.*

Cremer (Sylvio de Godoy). Contribuição ao estudo dos reflexos na lepra. [**The Reflexes in Leprosy.**]—*Rev. Brasileira Leprologia*. S. Paulo. 1939. Mar. Vol. 7. No. 1. pp. 63–74.

The results of this investigation support in general what we should expect from a knowledge of the pathology of leprosy. The reflexes, superficial and deep, were examined in various forms—cutaneous, nodular, nervous, and mixed—and stages of the disease and details of

findings in individual patients are recorded. These may be summarized as follows: in purely cutaneous forms the reflexes are unaffected; in the forms which attack the nerves we would surmise changes, and in fact all or any of the reflexes may be altered. In the purely nervous forms the degree of change corresponds roughly with the extent and severity of the disease, in the mixed forms in accordance with the degree of nerve involvement. It is noteworthy that after clinical cure of a patient reflexes which had been abolished or even diminished did not return to normal. Also in cases of neuritis in the course of the disease there may be exaggeration of reflex, but not in neuritis of parts in which the reflexes had already been lost.

The above is the general rule as regards the behaviour of the reflexes; there are, however, exceptions, though they are few. Some nerve cases of even three or four years' duration still retain their reflexes intact, while others of only 5–6 months' standing show definite changes. It is suggested, but further evidence is needed, that the former are mild forms, the latter severe forms of the disease; if this is true their presence or absence may serve as a valuable prognostic aid in nervous leprosy. *H. H. S.*

ACANFORA (Giuseppe). Sulla reazione di Rubino. [**The Rubino Reaction.**]—*Ann. d'Igiene.* 1939. Mar. Vol. 49. No. 3. pp. 152–159. [21 refs.]

The rubino reaction is the speed of sedimentation of washed formolized sheep erythrocytes in the serum of the patient. Defibrinated sheep blood is centrifuged and the plasma decanted. The cells are washed with saline several times and then suspended in an amount of saline so that the quantity of suspension equals that of the original blood taken. To this is added 10 per cent. of formalin (40 per cent. formaldehyde). Various dilutions of serum in saline are mixed with 0·2 cc. of the cell suspension to make a total of 1·0 cc. in tubes of 9–10 mm. internal diameter :—

	1.	2.	3.	4.	5.	6.
	cc.	cc.	cc.	cc.	cc.	cc.
Serum	0·5	0·25	0·1	0·5	0·25	0·1
Saline	0·3	0·55	0·7	0·3	0·55	0·7
Formolized cell suspensions	0·2	0·2	0·2	—	—	—
Non-formolized cell suspensions	—	—	—	0·2	0·2	0·2

Results are read after 15, 30, 45 and 60 minutes. Controls with non-formolized cells are used. The reaction is positive if the agglutino-sedimentation occurs only with the formolized cells or is definitely more intense than with the non-formolized cells.

In 23 tests on serum of patients with mixed leprosy the test was positive in 22. In 14 patients with pulmonary tuberculosis the test was negative, the non-formolized cells settling more quickly. In 65 patients with other diseases, malaria, leishmaniasis, amoebiasis, etc., it was similarly negative.

The author suggests a modification in which instead of non-formolized cells a control of definitely negative serum is used with the formolized cells. In this case a positive result is shown by rapid sedimentation with the serum to be tested.

The test therefore appears to be to a considerable extent specific for leprosy. [See also this *Bulletin*, 1927, Vol. 24, p. 557 ; 1928, Vol. 25, p. 978 ; 1929, Vol. 26, pp. 336, 617 ; 1930, Vol. 27, p. 1006 ; 1932, Vol. 29, pp. 553, 850.] *C. W.*

FERNANDEZ (José M. M.). Valor de la inyección subcutanea de leprolin en el diagnostico de ciertas formas de lepra. [**Subcutaneous Injections of Leprolin in the Diagnosis of Leprosy.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Mar. Vol. 7. No. 1. pp. 85–90. English summary.

" The author has made subcutaneous injections of 1 or 1·50 cc. of leprolin in patients with lepromatous and neural types of leprosy, lupus vulgaris, lupus erythematosus, and dermatitis factitia. He has observed :

" 1. In cases of tuberculoid leprosy, the injection produces within 24 hours, a general reaction consisting in rigors, arthralgias, and temperature ; a local reaction at the site of injection ; and a focal reaction, with erythema and congestion of pre-existent lesions.

" 2. In the cases of lepromatous leprosy, the injection of the same doses of leprolin does not produce any reaction.

" 3. In cases of lupus vulgaris, lupus erythematosus and artificial dermatitis, the injection of leprolin produces, within 24 hours, a moderate general and local reaction at the site of injection, but does not produce any modification in the pre-existent lesions.

" On the strength of these experiences the author suggests the use of the subcutaneous injection of 1 or 1·50 cc. of leprolin, as a diagnostic test between tuberculoid leprosy and other dermatoses, particularly those of tuberculoid nature such as Boeck's sarcoids."

HASSELTINE (H. E.). **The U.S. Marine Hospital (National Leprosarium), Carville, La. Review of the More Important Activities for the Fiscal Year ended June 30, 1938.**—*Public Health Rep.* 1938. Nov. 18. Vol. 53. No. 46. pp. 2025–2037.

This report gives an account of the many activities at the well-equipped U.S.A. settlement on the usual lines, for the year ending June 30th, 1938. The total patients were reduced from 365 to 349, with 75 discharges against 59 admissions and 36 deaths. Returned absconded patients numbered 17. Nearly all the patients received treatment, mostly by benzocaine-chaulmoogra oil intramuscularly and hydnocarpate esters. A satisfactory amount of improvement was observed except on the older advanced cases, a number of whom showed retrogression. New treatments were tried without any noteworthy results. Much laboratory, dental, orthopaedic and neuropsychiatric work was carried out. The farm and dairy work effected a useful saving. *L. Rogers.*

DA SILVA (Olavo Laudares). Tratamento das localizações leprosas nas vias aereas superiores e na bocca. [**Treatment of Leprotic Lesions of the Mouth and Upper Respiratory Tract.**]—*Rev. Brasileira Leprologia.* S. Paulo. 1939. Mar. Vol. 7. No. 1. pp. 75–84. With 6 figs. on 2 plates. English summary.

The lesions dealt with are congestion, dryness and localized lepromata of the mouth, pharynx, nose and larynx and the treatment recommended is, in the first place, application of 30 per cent. chaulmoogra in

olive oil every other day. If, as was not uncommon, this resulted in bleeding, the author applied 50 per cent. trichloracetic acid after the chaulmoogra once a week. If there are definite lepromata he is in favour of galvano-cautery or of cauterization of the wound after excision of the tumour. For laryngeal lesions if there is dyspnoea tracheotomy is recommended, but the average length of survival thereafter was only a year. *H. H. S.*

VIGNE (Paul), VIGNOLI, BONNET (R.) & TIVOLLIER. Maladie de Hansen ; cicatrisation rapide d'ulcérations trophiques par l'huile de chaulmoogra nitrée. [**Chaulmoogra Treatment of Ulcers.**]—*Marseille-Méd.* 1938. Oct. 5–15. Vol. 75. Nos. 28–29. pp. 385–388.

A nitrated chaulmoogra oil has been prepared with a view to diminishing the acidity of the commercial oils of from 15 to 20 per cent. of acidity, expressed as oleic acid, to about 1 per cent. Several heterogeneous substances are also removed from the oil in the process of treating it with nitric acid. The resulting preparation is dissolved in a fatty excipient for injection subcutaneously, and put up in ampoules which can be sterilized in an autoclave at 120°C. for twenty minutes. It proved to be non-toxic to guineapigs in 3 cc. doses.

An old nodular case of leprosy was treated with 1 cc. intramuscular injections, concurrently with those of novarsenobenzol on account of a positive Wassermann reaction. At the end of two months material improvement occurred, so the case is recorded to allow others to try this method. *L. R.*

TISSEUIL (J.). Action thérapeutique comparée, par voies veineuse, intramusculaire et intradermique, des huiles et des éthyl-esters de chaulmoogra dans les lèpres tuberculoides. [**Treatment of Tuberculoid Cases with Ethyl Esters of Chaulmoogra.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 202–207.

The author reports good results from the treatment of tuberculoid lesions by the intradermal method with the oils or esters of chaulmoogra and gorli seeds ; but not with the soaps of gorli and esters of olive oil. Intravenous and intramuscular injection were much slower in their action. *L. R.*

TISSEUIL (J.) & RIVOALEN (P.). Action de dérivés du beurre de Gorli : éther éthylique des glycérides solides, glycérides liquides, insaponifiables, en injection intradermique au niveau des taches tuberculoides. [**Gorli Preparation Treatment.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 819–824.

This paper reports on the use of preparations made from gorli seeds. Gorli butter mixed with 40 per cent. of olive oil had a good action on tuberculoid lesions, and so had the solid and fluid glycerides, but the unsaponifiable fractions were inactive. For the methods of making the various preparations used the original paper should be consulted. The injected skin areas showed an intense black discolouration, but this rapidly disappeared with the subsidence of the infiltration of the lesions. *L. R.*

Tisseuil (J.) & Guilhaumou (F.). Action de l'huile de ricin, de l'huile de foie de morue, du bleu de méthylène en solution à 1%, en injections intradermiques dans le traitement des taches tuberculoides. [**Action of Castor and Codliver Oil and Methylene Blue.**]—*Bull. Soc. Path. Exot.* 1938. Dec. 14. Vol. 31. No. 10. pp. 900–904.

The authors report on the action of the glycerides of certain fatty acids. Weekly injections into tuberculoid lesions of the skin caused darkening of the patches, but had no lasting beneficial effects. Similar preparations made from cod liver oil produced reactions in the injected lesions, but after the inflammatory infiltration subsided the treated patches reverted to their former condition. They also tried intradermal injections of 1 per cent. methylene blue, but here again they obtained no beneficial effects. *L. R.*

Velds (M.). Phenolroodtherapie bij lepra. [**Phenol Red in Leprosy.**] —*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Feb. 21. Vol. 79. No. 8. pp. 463–465. English summary (7 lines).

"In connection with published favourable results with phenolsulphonephthaleïn in two leper-patients, this dye was given in sixteen patients at the Poelau si Tjanang Leprosarium, however without any success or resulting improvement; on the contrary a slow increase could be stated in five patients.

"In consequence this dye, just like methylene blue, does not seem to be a specific drug for leprosy."

Radna (R.). Contribution à la question du traitement de la lèpre. (Première note.) [**Treatment of Leprosy.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. June 30. Vol. 18. No. 2. pp. 225–232.

This is a report on combined treatment by vaccines of Loewenstein's cultures of what he believes to be Hansen's bacillus, together with the chaulmoogra preparations, alepol or graumanyl. This gave better results than either method used alone. Tables show that in 118 cases treated for a year 31·66 per cent. were free from symptoms and from lepra bacilli, and 44·66 per cent. were greatly improved. *L. R.*

Malaihollo (J. F.). Beknopt verslag van de behandeling van leprozen met het anti-lepraserum van Prof. Reenstierna te Semarang. [**Treatment of Lepers with Reenstierna Serum.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1939. Mar. 7. Vol. 79. No. 10. pp. 601–618.

The two bacilli used for the production of the serum were a strain with variably acid-fast character isolated by Kedrowski in 1900 from a leproma and a similar strain isolated by Reenstierna from the blood of a leper in 1912. Mixed bouillon cultures were injected subcutaneously in the sheep to obtain the antiserum. Altogether 30 lepers have been treated and all chaulmoogra medication was stopped for at least one month before serum injections were begun. These injections, in a dose of 10 cc., were given intramuscularly in one or more series thrice weekly. No important bad effects resulted from the injections.

Thirteen of the patients were under close daily observation for two months and a record made of results :—(1) Lepromata and infiltrates—no effect. (2) Skin discolouration—gradual return to normal in two patients. (3) Nasal symptoms—improvement in practically all

patients within a few days but of little permanency. (4) Leprosy ulcers—superficial ulcers disappeared in a few days; more extensive ulcers, healing in one case. (5) Anaesthesiae—restoration of sensation where the neuritis had not existed too long. (6) Anaesthetic maculae—some improved but most showed no change. (7) Pareses—significant improvement in two cases. (8) Trophic ulcers—no effect, and so on.

W. F. Harvey.

MARIE-SUZANNE. L'huile de calophyllum dans le traitement de la lèpre. [**Treatment with Oil of Calophyllum.**]—*Rev. Méd. et Hyg. Trop.* 1938. Sept.–Oct. Vol. 30. No. 5. p. 271.

This brief note refers to the use of calophyllum, or dilo, oil by Dr. NEFF in Fiji for the relief of the pains of neural leprosy; and adds that a source of supply of the oil, which will be tested, has been found in Indo-China. *L. R.*

FÉRON (Jean). Le traitement de la lèpre à la léproserie Saint-Antoine à Harrar (Ethiopie). [**Treatment at Harrar.**]—*Rev. Méd. et Hyg. Trop.* 1938. Sept.–Oct. Vol. 30. No. 5. pp. 261–264.

The author claims very good results from the use of a copper compound he calls " zymbil-cuivre." This appears to be a very finely divided colloidal copper, the precise method of preparing which is not disclosed, but it is non-toxic, can be sterilized and is dissolved in an aqueous non-ionizable cinnamic ether. It is said to have cured 100 per cent. of macular and 50 per cent. of nodular cases, and arrested the evolution of the remainder. It is also claimed to be effective in grave ocular complications. *L. R.*

VISHNEVSKY (A. A.), Jr. **Novocaine Blockade in the Treatment of Leprosy.**—*Internat. Jl. Leprosy.* Manila. 1938. Oct.–Dec. Vol. 6. No. 4. pp. 477–490. With 4 text figs. & 9 figs. on 1 plate.

This method of treatment is based on the beneficial influence of anaesthetics on an acute inflammatory process reported by SPIES in 1901. One method of use is the " blockage of the sympathetic system in the lumbar region and the adjoining part of cerebrospinal nerves." A second is " circular blockage of the extremity completely interrupting its innervation." Illustrations show the injection in the lumbar region of 150 to 200 cc. of 0·25 per cent. novocaine with two drops of adrenalin per 100 cc. Similar amounts are injected into the subcutaneous tissues around an extremity. In a group of 50 cases local leprous patches and nodules are said to have been resolved and ulcers healed. In another group restoration of sensibility and motor capacity was observed, and diagrams of the improvement in the sensory condition are given. In a third group lepra reactions were aborted. *L. R.*

CHOWHAN (J. S.) & CHOPRA (R. N.). **The Use of Cobra Venom in Nerve Leprosy.**—*Indian Med. Gaz.* 1938. Dec. Vol. 73. No. 12. pp. 720–725. [18 refs.]

The authors point out that in India about 75 per cent. of leprosy cases are of the nerve type with symptoms of neuritis. The injections

of cobra venom relieve the symptoms in a large number of patients. The power of the venom to destroy newly-formed tissues is discussed, and it is said that in tissue cultures such destruction may be brought about. Trials of cobra venom together with the vitamin-B complex are advocated in nerve leprosy. *L. R.*

VILLELA (Gilberto G.). Ueber die Beeinflussing der Lepra durch Vitamin B_1 und C (Aneurin und Ascorbinsäure). [**Vitamins B_1 and C in Treatment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Mar. Vol. 43. No. 3. pp. 127–129.

The author reports that 1 to 2 milligrammes of Vitamin B_1 intramuscularly are beneficial in the treatment of nerve leprosy pains. It also has a general effect in all cases on the weight of the patients. Injection of aneurin decreases the blood sugar and cholesterin. In dermal cases vitamin C has no direct effect, but may aid the action of chaulmoogra treatment, and vitamin B_1 has a similar effect. *L. R.*

GATTI (Carlos) & GAONA (R. Jiménez). Cebion bei der Lepra-Behandlung. [**Cebion Treatment.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Jan. Vol. 43. No. 1. pp. 32–33.

Two cases of leprosy, one in a septicaemic stage and the other with numerous abscesses, have been treated with cebion in addition to chaulmoogra preparations with beneficial results. *L. R.*

UGARRIZA (Ricardo G.). Cebion bei der Behandlung von leprösser Septicaemie. [**Cebion in Leprosy Septicaemia.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Jan. Vol. 43. No. 1. pp. 33–34.

A patient while under chaulmoogra treatment developed a septicaemic fever of three months' duration, and laboratory tests gave negative results for typhoid and malaria. Oral tablets of cebion were followed by a decline of the fever in three days with improvement in the condition of the patient. *L. R.*

CLERCKX. Le traitement de la lèpre par le chaulmoograte de diéthylamine. Quelques observations. [**Treatment by Diethylamine Chaulmoograte.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 373–376.

Brief notes are given of fifteen patients treated by painless intravenous injections twice a week with from ½ to 2 cc. doses of diethylamine chaulmoograte. Most of the cases showed general improvement and healing of ulcers took place. The effect was not so good on macules, and when they disappeared they tended to return after two months. *L. R.*

KHAN (Joseph S.). **Treatment of Leprous Trophic Ulcers.**—*Leprosy in India.* 1939. Jan. Vol. 11. No. 1. pp. 19–21.

The author reports good results from the removal of dead bone, etc., from chronic ulcers, and then affording rest and protection from pressure by the application of plaster of Paris, and the local use of two per cent. acriflavine or of gauze. *L. R.*

MAYNARD (N. H.). **The Treatment of Trophic Ulcers in Leprosy.**—*East African Med. Jl.* 1938. Dec. Vol. 15. No. 9. p. 307.

This worker advises removal of carious bone and trimming the dead skin back to the level of the base of the ulcer; followed by antiseptic dressings of 1–1000 perchloride of mercury to clean the ulcers. She then fills the ulcer with a warmed mixture of an ointment composed of beef suet 2 parts, ghee (melted butter) 1 part and beeswax ½ part, and covering with cotton wool and a sewn on bandage. The application is renewed every third day for the first two weeks, and then once a week. Of 60 cases 50 healed within six months. *L. R.*

DE GOLDFIEM (Alice S.) & DE GOLDFIEM (Jean S.). La phytothérapie de la lèpre. [**The Phytotherapy of Leprosy.**]—*Rev. Méd. et Hyg. Trop.* 1938. Sept.–Oct. Vol. 30. No. 5. pp. 272–282.

This note gives a list of the trees furnishing oils with the composition of chaulmoogra. Some references to the literature of their chemistry are also quoted. *L. R.*

VELDS (M.). Welke therapie bij lepra? [**Treatment of Leprosy.**]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1938. Dec. 13. Vol. 78. No. 50. pp. 3152–3164. With 11 figs. on 2 plates. English summary.

BENCHETRIT (A.). Comentarios al segundo centenar de enfermos de lepra curados bajo la dirección del Dr. A. Benchetrit, en el Lazareto de Agua de Dios. [**A Second Series of One Hundred Lepers treated in Agua de Dios.**]—184 pp. With numerous illustrations. 1938. Bogota. Editorial Minerva, S.A.

FABRE (Maurice). Le traitement de la lèpre par des injections associées d'huile de chaulmoogra et de bleu de méthylène. [**Chaulmoogra and Methylene Blue Treatment.**]—*Rev. Méd. et Hyg. Trop.* 1938. Sept.–Oct. Vol. 30. No. 5. pp. 249–252.

BURSCHKIES (K.). Flacourtiaceenöle und ihre Derivate. [**Flacourtiaceae Oils and their Derivatives.**]—Reprinted from *Angewandte Chemie.* 1938. Vol. 51. p. 772.

DE BRAUWERE (P.). Vues d'ensemble sur la situation de la maladie du sommeil et de la lèpre dans les territoires sous l'action du "Foréami" durant l'année 1936. [**Sleeping Sickness and Leprosy in the Areas controlled by the Foréami during 1936.**]—*Ann. Soc. Belge de Méd. Trop.* 1938. Sept. 30. Vol. 18. No. 3. pp. 381–418.

This note records figures of leprosy incidence in a part of the lower Congo. The author advocates treatment with chaulmoogra esters and Perier's gynocardate of soda, and village segregation with agricultural employment. *L. R.*

KEIL (Ernst). Lepra und Erbfaktoren. [**Heredity in Leprosy.**]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1939. Mar. Vol. 43. No. 3. pp. 95–102. With 10 figs. [16 refs.]

The author discusses the predisposing action of heredity in leprosy. He mentions five sets of twins with both infected in two of them, and in another group of cases one of two sets of twins showed both attacked by leprosy. *L. R.*

Burnet (Et.). Examen de quelques réactions d'immunité et d'allergie dans la lèpre murine. [**Reactions of Immunity and Allergy in Rat Leprosy.**]—*Arch. Inst. Pasteur de Tunis.* 1938. Dec. Vol. 27. No. 4. pp. 360–367.

The results of repeated inoculations of rats and mice with Stéfansky's bacillus are recorded. When rats are re-inoculated after an interval of six to eight months, nothing of the nature of Koch's phenomenon in tuberculosis is seen. In the case of mice a tendency to abscess formation is observed after re-inoculation. With repeated re-inoculations at short intervals some degree of increased sensibility was noted; but not a specific allergy. Re-inoculations into the peritoneal cavity after two to six months produced in rats a very feeble and brief phagocytosis as compared with that in mice; for the leucocytes and reticulo-endothelial system do not in rats fix the bacilli in the way they do in mice. Further development of the bacilli in rats is mostly in the interstitial tissues, and in mice it is more intracellular in nature.

L. R.

Marchoux (E.) & Chorine (V.). Le phénomène de Koch ne se produit pas chez le rat par réinoculation du bacille de Stéfansky. [**The Failure of the Bacillus of Stéfansky to produce the Koch Phenomenon in the Rat.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 809–815.

These workers also found that the phenomenon that Koch described following the re-inoculation of tubercle bacilli into an animal does not occur on the re-inoculation of Stéfansky's rat leprosy bacillus. Instead a fresh infection results that aggravates the former one. Nor does the injection of masses of the rat bacillus provoke any signs of intoxication. We may therefore suppose that in the case of human leprosy superinfections may take place. *L. R.*

Prudhomme (R. O.). Conservation du bacille de la lèpre du rat dans un milieu où pousse le bacille de la fléole. [**Preservation of the Rat Leprosy Bacillus in a Medium in which** *Myco. phlei* **is growing.**]—*Bull. Soc. Path. Exot.* 1938. Nov. 9. Vol. 31. No. 9. pp. 815–818.

The author reports that he has succeeded in preserving the virulence of Stéfansky's bacillus for seven months at 37°C. in Sauton's medium adjusted to *p*H 6·5. At room temperature they did not survive more than forty days. *L. R.*

Gavrilov (W.), Dubois (A.) & Fester. L'infection expérimentale du rat par le bacille de Stéphanski observée en Belgique. [**Experimental Rat Leprosy Infection in Belgium.**]—*Internat. Jl. Leprosy.* Manila. 1938. Oct.–Dec. Vol. 6. No. 4. pp. 515–528. With 12 figs. on 3 plates.

These workers report that they obtained small colonies of Stéfansky's bacillus on Denys's medium and on potatoes up to the fifth transfer. The pathogenicity could only be maintained with difficulty and not very characteristically. They think geographical conditions may affect the results. *L. R.*

LYON (M.). Le rat ne réagit pas à la léproline de Mitsuda. [**Leprolin Reactions in Rats.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 134–136.

The intradermic injection of Mitsuda's leproline prepared from Stéfansky's bacillus gives negative results in both healthy and infected rats. *L. R.*

PRUDHOMME (R. O.). Préparation d'une émulsion de bacilles de Stéfansky à partir d'un léprome et évaluation de sa richesse. [**Preparation of Rat Leprosy Bacillus Emulsions.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 136–138. With 1 fig.

PRUDHOMME (R. O.). Action du bacille de Stéfansky sur certains acides aminés, *in vitro*. [**Action of Stéfansky's Bacillus on Amines.**]—*Bull. Soc. Path. Exot.* 1939. Feb. 8. Vol. 32. No. 2. pp. 138–141.

REVIEWS AND NOTICES.

BANERJEA (J. C.) [M.B.(Cal.), M.R.C.P.(Lond.), etc.] & BHATTACHARYA (P. B.) [M.B., D.T.M.(Cal.), Bengal Medical Service, Upper, etc.]. **A Handbook of Tropical Diseases with Treatment and Prescriptions.** Second Edition, Thoroughly Revised, Re-Written, Enlarged & Brought Up-to-Date.—pp. x+413. With 1 plate & 22 figs. (13 coloured). 1938. Calcutta: U. N. Dhur & Co., 15 College Square. [Rs. 7–8–0. Cash price in Great Britain 15*s*.]

The preface to this book expresses the hope that it will prove helpful to senior medical students in their final examination and to practitioners, and that all unnecessary theoretical details have been avoided. These statements explain the fact that the text consists largely of long numbered lists of symptoms and points of differential diagnosis, with very little indication of their relative importance. The contents are also noteworthy, for important diseases occurring in other tropical countries than India are omitted, such as yellow fever and trypanosomiasis, as well as others that do occur to some extent in India; including undulant fever, yaws, tropical ulcer, inguinal ulcerative granuloma, madura foot and lymphogranuloma. On the other hand, smallpox and typhoid fever, which are very prevalent in India, are included with advantage to the Indian student. Under filariasis only the conditions produced by *W. bancrofti* are dealt with. Lathyrism and pellagra as well as schistosomiasis are also omitted.

Malaria rightly occupies one of the longest chapters and appears to follow very closely in an abridged form Sir John Megaw's article in Rogers' and Megaw's *Tropical Medicine*. Long lists of points in differential diagnosis involve repetition, and in some instances appear to be over-elaborated. Kala azar, for example, hardly requires separate lists of symptoms for its differentiation from acute miliary tuberculosis and Hodgkin's disease. Malaria is differentiated from pneumonia, but not from dengue with which it was for a long time confused.

Many of the chapters contain much detailed information, nearly all of a clinical form, for pathological details are scantily dealt with. Under cholera, for example, no information is given on the recent

work on the value of the O antigen in identifying the true causative organism. In the differentiation of cholera from algid malaria the practical point of the low sp. gr. of the blood in malaria due to anaemia is not mentioned. In its treatment morphia is advised for the relief of cramps, although they disappear rapidly following saline infusions and the drug greatly predisposes to uraemia. The description of amoebic dysentery is useful, but the date of the discovery of the value of emetine is twice given as 1902 in place of 1912. Amoebic hepatitis and liver abscess are dismissed in the altogether inadequate space of one page. The chapter on leprosy is a good one. Under sprue atrophy of the mucous membrane is emphasized, although recent observations made on fresh post mortems discount its occurrence. Under epidemic dropsy Sir John Megaw's important work is not mentioned. Under snake poisoning permanganates are said to "exidise" the venoms; evidently a misprint for oxidize, but such misprints are few.

There are very few illustrations and the magnifications of the microscopical illustrations are not given. The index consists of the main sub-divisions of the articles under each chapter with no cross references. It is of very little use. The ten pages of prescriptions deal much more with common diseases of all kinds than with tropical ones. They include mixtures for asthma, bronchitis, conjunctivitis, cough, earache, various common skin diseases, epilepsy, insomnia, lumbago, etc.

The general character of this book can be gathered from the above account of its contents. It cannot be recommended as a text-book of tropical medicine, but it contains a lot of tabulated facts and guides to treatment, regarding the limited range of subjects it deals with, that should fulfil its avowed purpose as a help to senior students in preparing for examinations. *L. Rogers.*

Dumas (J.) [Chef de service à l'Institut Pasteur]. **La dysenterie bacillaire.** [Bacillary Dysentery.]—89 pp. With 1 plate. [Bibliography.] 1938. Paris: G. Doin & Cie., 8 Place de l'Odéon. [28 fr.]

Bacillary dysentery is an important disease which suffers singularly from neglect in most text-books, so that any contribution to its more general understanding should be welcomed. The present brochure to some extent fills this gap, as it entails a good general, but by no means profound, study of the disease; nor can it be termed exhaustive, for there are several aspects, notably bacteriological, which are somewhat sketchy, and there are of course statements to which exception can be taken. It is surely untrue, for instance, to state (p. 12) that "*Amoeba histolytica* was discovered by Schaudinn in 1902."

In considering epidemiology great importance is attached to the continued existence of dysentery bacilli in the soil, but no reference is made to carriers, contaminated water, or to flies as important factors in the spread of the disease.

A curious omission is that no mention is made of Sonne dysentery, and this is all the more regretted because the symptomatology of Shiga and Flexner dysenteries are given separate consideration, on the assumption that they can be distinguished clinically, but, at the same time, Dumas states that, in all but the very acute and

fulminating cases, differential diagnosis from *Amoebic dysentery* is difficult, if not impossible, to make, for the signs and symptoms of the two diseases are identical, and the doctor, divorced from the laboratory, can do so only as the result of observing the effects of emetine therapy. A further statement, which will not gain general acceptance, is that, as a general rule, agglutination tests with the patient's serum are of great importance in diagnosis. The pathology is based upon the classical description of Ch. Dopter.

In the description of complications considerable importance is attached to perforation of the colon causing general peritonitis, to the adrenal syndrome and also to a kind of poliomyelitis, " Paralysies dysenteriques " which is not generally referred to in the text-books.

The value of treatment by antidysenteric serum is emphasized and the practical effects of bacteriophage therapy discounted.

From a general standpoint this contribution to bacillary dysentery can hardly be considered international, for references to English, American and workers of other nationalities, who made such important war-time contributions to bacillary dysentery, are singularly neglected. The one exception is Broughton Alcock who is referred to as " Broughton & Alcook." There are, it is true, 133 references confined almost entirely to French writers. One illustration, a photographic reproduction of a bacillary dysentery bowel, enlightens this work.

P. H. Manson-Bahr.

Purcell (F. M.) [M.D. (Dublin University), M.R.C.P. (Ireland), D.T.M. & H. (London), Colonial Medical Service, Gold Coast]. **Diet and Ill-Health in the Forest Country of the Gold Coast.**— pp. viii+77. With 62 figs. 1939. London : H. K. Lewis & Co. Ltd. [7*s.* 6*d.*]

Dr. Purcell has undertaken a difficult task—to give an account of the physical condition of the people of a country district in West Africa, of their diet and food-habits, and of the morbid conditions associated with or due to malnutrition—on a purely clinical basis. His undertaking is made all the harder because he has no personal laboratory or experimental investigations to support his theses and for figures of food analyses has had to rely on others.

The author has divided the account into two sections ; the first deals with the people of Akim, living in a forest district to the south of the Gold Coast Colony, and their diet, the second with the many clinical syndromes which he considers attributable to malnutrition.

The average height of a male adult is 5 ft. 4 in., the female about 4 inches less, and their general physique is poor as compared with the tribes of the Northern Territories. Their diet is mainly vegetable, meat is a scarcity and fish far from plentiful and is mostly imported salted or smoked, the local supply being insignificant. A list of the available foods is given and it is shown that though the total calorie value is high, the fats and protein constituents are low. Children at the school appear to be in good health, though the diet comprises mainly plantain, cocoyam and cassava, little fruit and no meat. Even nursing mothers have only 30–50 gm. of protein daily and that of low quality and only 10 gm. of animal origin, and 30 gm. fat, 5 gm. only of animal fat. It is probable, seeing that the children in many cases appear well, that they have adapted themselves to their diet, but that they live on the borderline, as it were, and any stress or infection breaks

down the reserve of resistance. The fertility rate is high—6·9 children per mother—but infant mortality is also high, some 20 per cent. in the first year and 43 per cent. in seven years.

The second section, though highly interesting, is not very satisfying, for the findings, as stated above, are purely clinical and unsupported by any laboratory or experimental work. This is not the fault of the author for he had no laboratory and he was probably too busy to undertake experimental investigations. Nevertheless, the fact remains that a large number of conditions are described and too many subdivisions made of the small total of 210 cases. The conditions detailed are ascribed to defective nutrition because they occur among poor class natives, whose diet is unbalanced, because " similar diseases have been described by others, and ascribed to faulty nutrition," and because improvement occurs when the patients are given a nourishing diet. These reasons are not very satisfying ; ankylostomiasis is common among poor class natives, and leprosy will improve, before any specific treatment is given, when a nourishing diet is taken, but these are not, therefore, ascribed to malnutrition.

Dr. Purcell divides his cases into four main clinical groups : (1) With alimentary symptoms predominating, followed in some by oedema, in others by dermatitis. (2) Dermatitis cases without preliminary alimentary disturbance. (3) Oedema cases. (4) Nervous disorders. Alimentary symptoms cover a fairly wide range and include stomatitis, glossitis, bad dentition, bleeding gums, ulceration of the buccal mucosa and others. Oedema may or may not be accompanied by albuminuria ; the latter are regarded as nephrotic or nephritic and may terminate by acute pulmonary oedema. Diarrhoea is commonly present also. It is found often in children who are still being breast fed, though the mother is again pregnant, the nursing being supplemented by " scraps." Even at the best of times the mother's milk is of poor quality and tinned milk is better. Among the conditions characterized by dermatitis the author describes kwashiorkor [see this *Bulletin*, 1934, Vol. 31, p. 344 ; 1936, Vol. 33, pp. 410 and 734] first recorded by Dr. Cicely WILLIAMS in the Gold Coast, but shows that in the same (or very closely similar) conditions described by himself maize cannot be incriminated. The pathology he does not describe and the pathogeny he regards as obscure and wisely refrains from attempting to explain it. He discusses Clarke's theory of pellagra being due to chronic prussic acid poisoning without stopping to consider whether there is any evidence that chronic HCN poisoning does occur (apart from its supposed action in causing pellagroid symptoms).

Under the heading of *Nervous disorders* is a very mixed bag ; it includes those who are merely apathetic or emotional with fits of temper ; those backward in or showing reluctance to walking, those exhibiting a sudaminal rash and head sweating. Some resemble markedly cases of Feer's acrodynia.

In the category of skin disorders are included cases of atrophy and eczema, dermatitis and pigmentation, ecthyma, and ulcers the result of scratching.

Regarding treatment the author has little to say ; most of the patients were extern and treatment of any kind he found of little avail. He recommends on general lines a better diet with more meat, supply of tinned milk, retaining of red rice in place of the present method of

selling it and buying milled rice, and so on, and further analyses are needed and study by biochemists as well as clinicians.

The work is well illustrated and the original photographs must have been exceptionally good to bear so much reduction. Rashes and eruptions rarely show well in uncoloured photographs and when reduced to the size of a postage stamp as some of these photographs are, they are really wasted, and many are too dark to show much; others, however, are very good. The whole would be improved by addition of an index. *H. H. S.*

WIGGLESWORTH (V. B.) [M.A., M.D., F.R.S., Reader in Entomology in the London School of Hygiene and Tropical Medicine]. **The Principles of Insect Physiology.**—pp. viii+434. With 316 figs. 1939. London: Methuen & Co., Ltd., 36 Essex Street, W.C.2. [30*s.*]

Dr. Wigglesworth has produced a general account of the physiology of insects in which he deals with development and growth, and the various systems such as the integument, muscles, and the organs of digestion, respiration and reproduction: there are also chapters on the central nervous system, sense organs, and the behaviour of insects. The book is fully illustrated with line drawings, many of them from the author's own papers, in which he has already made important contributions to many sides of insect physiology.

To readers of this *Bulletin* the significance of this book is that nearly every problem in the control of insects makes an intelligent person look for information on their physiology. For instance, one could hardly use an insecticidal method (such as fumigation, or poisoned baits) without having a general knowledge of the functions of an insect, and particularly of its respiration or digestion; and it is not only in controlling insects, but also in studying the epidemiology of certain diseases that one meets riddles which the physiologist alone can answer. Why is it that rat fleas are rare in hot, dry weather? Because their larvae, not the fleas themselves, are inadequately protected against loss of water through the tracheal system. Or, why is it that malaria is so much more grave in one part of a country than another? The immediate answer depends on the local distribution of particular species of Anopheles: penetrating the subject more deeply, one frequently finds that that in turn hangs upon some point of larval physiology, such as a need for calcium, or an ability to extract traces of salt from natural pure waters. One cannot pretend that insect physiology will answer all our riddles, but it has already explained some of them and it gives us a necessary background of knowledge.

A man concerned in controlling insects might perhaps find particular value in the chapter which deals with behaviour, for he will realize that insects' behaviour is rigid and predictable, at least in some directions, and he may use this knowledge to avoid damage, or achieve cheap control. It is exceedingly difficult for us to understand the behaviour of insects, for their whole organization and the structure and position of their sense organs are so different from our own: some insects can perceive ultra-violet radiation, carbon dioxide, and water vapour, so that they must live in a perceptual world very different from ours. It has therefore been a difficult matter to devise experiments sufficiently critical and subtle. But, as this book shows,

much progress has been made and we may now begin to understand what it is that keeps an insect active or at rest, and to recognize some of the stimuli which direct its movements, or bring it to places where it feeds or lays its eggs.

Readers of this *Bulletin* may be proud to notice the extent to which medical workers have developed the science of insect physiology.

P. A. Buxton.

MacKenna (Robert M. B.) [M.A., M.D., B.Ch.(Camb.), M.R.C.P. (Lond.), etc.]. **Aids to Dermatology and Venereal Disease.** Second Edition.—pp. vii+284. With 7 figs. 1939. London: Baillière, Tindall & Cox, 7 & 8, Henrietta Street, Covent Garden, W.C.2. [4*s.* 6*d.*]

The Students' Aid Series comprise small volumes which can easily be slipped into an ordinary jacket pocket. It is therefore absolutely impossible for any one of the books to deal exhaustively with its subject. They are not text-books but "reminders." At the same time this particular member of the group does contrive to contain a remarkable amount of accurate information. It must be realized that the mere fact that a patient happens to live in the tropics does not prevent him from suffering from an "ordinary" dermatosis, for sight of this fact is apt to be lost in the luxuriance of the diseases more peculiar to the tropics. These latter do not of course occupy much space in this volume but some reference is made to the most important of them. The section on venereal diseases gives an excellent summary of the modern methods of treatment and is absolutely up to date.

Sydney Thomson.

Henry Lester Institute of Medical Research (Shanghai, China). **Annual Report 1937–1938.**—90 pp. With 2 plates.

This Report covers the work of two years and summarizes the considerable amount of work carried out, much of which has been abstracted in this *Bulletin*. Deficiency diseases, nutrition, the study of certain helminths and investigations in malaria and in the transmission of filariasis and relapsing fever are of interest to readers of this *Bulletin*. The long lists of papers published testify to the energy and enthusiasm of the staff under the disturbed and trying conditions which have recently existed.

C. W.

Printed under the authority of His Majesty's Stationery Office
by the South Essex Recorders, Ltd., Ilford.

(1616) Wt. P19/222 1875 8/39 S.E.R. Ltd. Gp. 432.

THE HOSPITAL FOR TROPICAL DISEASES

is open to ALL sufferers from Diseases peculiar to the Tropics. H.M.'s Government Offices have entered into official arrangements for the treatment of Officials in Private Wards. The Ministry of Pensions recommend Officers and others for special treatment; and certain large commercial firms, in consideration of their annual subscriptions, enjoy special terms for the benefit of their members.

ADMISSION

may be obtained to Private Rooms, two-bedded Rooms and larger Private Wards on moderate terms either through the Honorary Medical Staff, or in suitable cases, through the Out-Patient Department. Seamen and all necessitous persons are treated free.

Laboratory investigations constitute a special feature of the Hospital régime; these facilities are available for medical practitioners.

EDUCATION

In the General Wards is found the unrivalled variety of clinical material, drawn from all parts of the Tropical Zone, which is placed at the disposal of the students of the London School of Hygiene & Tropical Medicine, and others.

Special Courses in Tropical Nursing are held twice a year.

In 1897, Sir Patrick Manson began in London his work among the Seamen who are the special care of the Seamen's Hospital Society, and the Voluntary Corporation to-day maintains this Special Hospital.

Enquiries to the Resident Secretary, Hospital for Tropical Diseases, 25, Gordon Street, London, W.C.1.

UNIVERSITY OF EDINBURGH. FACULTY OF MEDICINE.

DIPLOMA IN TROPICAL MEDICINE AND HYGIENE.

The Course of Instruction (covering a period of about 6 months) for the above Diploma is given from October to March. The course may be taken in two parts. Candidates must possess a medical qualification which is registrable with the General Medical Council of Great Britain.

DIPLOMA IN TROPICAL VETERINARY MEDICINE.

The Course of Study for this Diploma covers a period of about six months. It is given from October to March, but may be taken in two parts each of about three months duration. Candidates must hold a Veterinary Qualification which is registrable with the Royal College of Veterinary Surgeons.

Further particulars of the above Diplomas can be obtained on application to the Dean of the Faculty of Medicine, University New Buildings, Edinburgh, 8.

ISSUED UNDER *the* DIRECTION *of the* HONORARY MANAGING COMMITTEE *of the* BUREAU *of* HYGIENE *and* TROPICAL DISEASES.

BULLETIN OF HYGIENE

An illustrated review of current papers and reports and of the more important publications on public health and preventive medicine throughout the world.

ISSUED MONTHLY. Subscription: 21s. a year, post free.

Orders and Subscriptions should be sent to—

THE BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, Gower Street, W.C.1.

BUREAU NOTICES.

The Director will be glad to receive early copies of works or reprints on Tropical Diseases for notice in the *Tropical Diseases Bulletin* and for the Library. (Telephone: MUSEUM 3041.)

Publications of the Bureau of Hygiene and Tropical Diseases.

TROPICAL DISEASES BULLETIN

containing classified summaries of current papers and reports from the medical and scientific publications of the world on diseases of the tropics and warm countries

(ISSUED MONTHLY.)

Subscription rate (in advance): 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

SUPPLEMENTS TO THE TROPICAL DISEASES BULLETIN

summarizing the Annual Medical and Sanitary Reports from British Colonies, Protectorates and Dependencies.

(ISSUED ANNUALLY.)

Back Supplements can be supplied as follows:—

Dec. 1931	SUPPLEMENT dealing with the Annual Reports for 1929.	Price 2s. 6d. net.
Oct. 1932	" " " " " 1930.	Price 2s. 6d. net.
Oct. 1933	" " " " " 1931.	Price 5s. 0d. net.
Dec. 1934	" " " " " 1932.	Price 5s. 0d. net.
Nov. 1935	" " " " " 1933.	Price 7s. 6d. net.
Oct. 1936	" " " " " 1934.	Price 7s. 6d. net.
Nov. 1937	" " " " " 1935.	Price 7s. 6d. net.
Nov. 1938	" " " " " 1936.	Price 7s. 6d. net.

The Subscription rate for the TROPICAL DISEASES BULLETIN with SUPPLEMENT is 25 shillings per annum.

BULLETIN OF HYGIENE

containing classified summaries and reviews of publications on all branches of public health and preventive medicine.

(ISSUED MONTHLY.)

Subscription rate (in advance): 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

ORDERS and SUBSCRIPTIONS may be sent direct to the

BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street,
Gower Street,
London, W.C.1

or through any bookseller.

Cheques and Postal Orders should be made payable to the "Bureau of Hygiene and Tropical Diseases," and crossed "Westminster Bank Ltd."

The Bureau has from time to time obtained, by purchase or otherwise, copies of journals or monographs for its correspondents. In view of the difficulties which the ordinary agent meets in carrying out commissions of this kind, the Bureau is prepared to do its best to obtain such publications or photogram copies of particular papers, for any of its subscribers. Out-of-pocket expenses will be met by the applicant, who should state the amount he would be prepared to pay for the journals or monographs or photogram copies required, and, when possible, send a money order with his application or a reference to an agent who will meet the cost incurred.